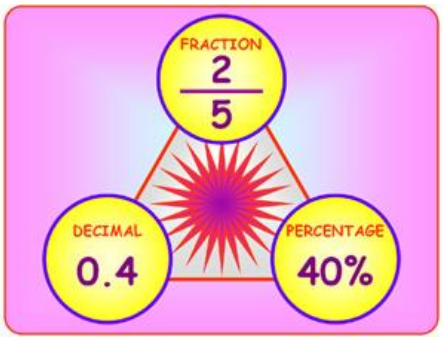
FSTU 3913 Nursing Maths



Pukamahi Rua (Workbook Two)

Inenga, Hautau, Ōrau

(Measurement, Fractions and Percentages)

Ingoa: _____

Lecturer:……..

Office:

Phone:

Email:

Classes:

Day			
Time			
Room			

Tutorial:

Asessment and Topic schedule

The FSTU 3913 Nursing Maths Course Weekly outline for assessment events and topics for semester 1 2021, can be found on Moodle with the latest updates.

Maths learning support to improve your grades:

Maths help is available through the Student Services, Learning Advisors.

The Maths and Science Learning Advisors are located at Te Puna, Library building 180, at Mt Albert campus and Waitakere campus in Room 510-3015 (3rd floor, over the sky bridge) in the Library.

The Maths and Science Learning Advisors are Lance Laulala, email: llaulala@unitec.ac.nz (Mt Albert), Richard Segedin, email: rsegedin@unitec.ac.nz (Mt Albert on Fridays only) Margaret Evans, email: mevans@unitec.ac.nz (who is at both Waitakere and Mt Albert). Margaret is available at Waitakere campus in Room 510-3015 in the Library, on Thursdays from 9am - 4.20pm and on Fridays from 9am to 1.20pm (or later by arrangement). The last booking time on Fridays with Richard is 4.30pm.

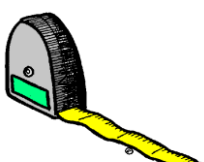
Bookings can be for 1 person, or a group of classmates. Bookings can be on Zoom, or in person. You can follow the booking information below, or drop in to see if a Learning Advisor is free.

Book an appointment for a one-hour session at either campus by:
booking online at https://guides.unitec.ac.nz/labookings/numeracy
or phoning free phone number 0800 10 7510
or by asking at the Library desk.

Mt Albert - drop-in anytime to the Maths and Science Study Space on level 2 of Te Puna library. This is a place you can use at to do your maths or biology work. This space has desks and whiteboards for student use, so it's handy to come with other classmates. Lance, Margaret and Richard (Fridays) are there to give you help if they are not with another student on a one-to-one appointment.

Another source of maths help is the web based on-line maths resources. Links to a selection of these are found at the UNITEC library webpage under “DIY Maths” found under “library guides” of the UNITEC library site. Visit the site at http://libguides.unitec.ac.nz/DIYmaths or use the link on your Moodle page
A website to practice metric conversions is http://www.testandcalc.com/quiz/index.asp

Contents



Measurement: **MEASUREMENT UNITS**

Exercise 1

1. Match the quantity with its unit and write the symbol:
   Units of measure to select from: litres, square metres, grams, metres seconds, degrees Celsius, kilometres per hour, cubic metre

   Note: when plural never add "s" to the end of the symbol of the unit

Measured feature	Unit of measure used	Symbol for unit of measure
(a) length		
(b) time		
(c) mass		
(d) area		
(e) liquid capacity		
(f) volume		
(g) temperature		
(h) speed		

2. What metric unit would you use to measure:

Measured feature	Units of Measure used	Symbol
a) The height of the classroom		
b) The distance from Auckland to Whangarei		
c) The thickness of your little finger		
d) The weight of your textbook		
e) The amount of water in a fish tank		
f) The weight of an aircraft		
g) The amount of medicine on one spoon		
h)The amount of wine in a standard bottle		
i) The length of a football field		
j) The amount of water in a bath		
k) The weight of a mouse		
l) The thickness of a piece of wire		
m) The capacity of a milk bottle		
n) The diameter of a 10 cent piece		
o) The amount of water in a raindrop		
p) A quantity of apples		

Measurement: **ESTIMATION**

It is sensible to have an approximate idea of the answer you are looking for before you make a measurement, in case you can't make an exact measurement, and as a means of checking your answer.

A small length can be estimated using the width of your little finger as 1 cm. Most people can estimate 1 m as the distance of a large stride or the length of their outstretched arm from fingertip to opposite armpit, or 1.5 m from the fingertips of one arm to the fingertips of the other arm if they hold both arms out to the side at shoulder height. Check yours!

Do you have any other body parts that can provide a standard measurement?

Start to look at the items in your cupboard as you prepare a meal. Think about the measurements written on them. Are they in millilitres, litres, grams or kilograms. How do they compare with each other? Remember one or two items as a reference point.

For liquid capacity, think of a standard cup (250 mL, or ¼ L) or a soft drink can (330 – 350ml). Also, 1 tsp is 5 mL. Can you picture a 1 litre milk bottle?

For mass measurements, remember 1 litre of milk weighs 1 kilogram. Hold that weight and get the feel of it, to compare with other weights. Do the same with a pack of butter, margarine or cheese. Weigh your backpack and use that as a comparison with other mass measurements. Or think of the weight of items you usually buy, such as a bag of potatoes, rice or potting mix.

Exercise 2
Choose the best answer for the following:

1. The capacity of your car's petrol tank	5L	750ml	50L
2. The capacity of a coke can	50ml	300ml	1.5L
3. The diameter of a dinner plate	26cm	40cm	50cm
4. The capacity of a large bottle of lemonade	2L	5L	10L
5. The length of a car	4m	40m	400m
6. The length of a bed	400mm	0.3m	200cm
7. The weight of a cat	3kg	300g	80kg
8. The weight of an orange	200g	1kg	20g
9. The weight of 1L of water	4kg	1kg	400g
10. The height of a 15-year-old	100cm	150cm	200cm
11. The length of a pen	5cm	15cm	25cm
12. The weight of a 50 cent piece	20g	200g	20mg

Key Concept 1: Reading Scales

Before reading a scale, look at the following:

What are the units?

What are the tick labels?

How many increment divisions are there between labels?

You can't read the value until you know what each small tick mark means.

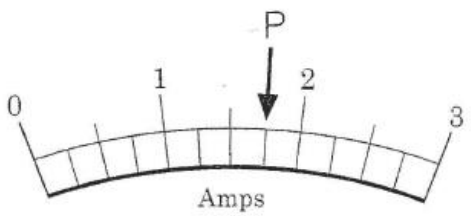
<u>Reading Scales</u>: Nursing Calculations Pages 68 – 71

Measurement: **<u>READING SCALES</u>**

Exercise 3

Question 1

Read the measurements on these scales.

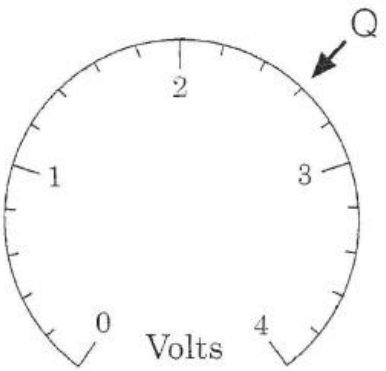


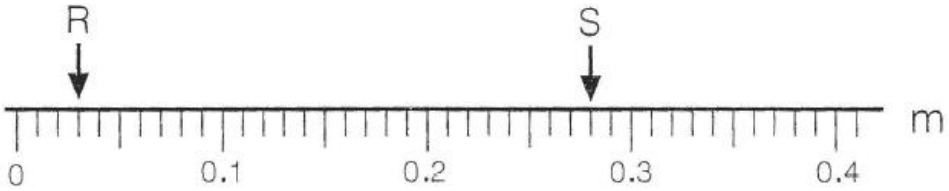
P = ...

Q = ...

R = ...

S = ...

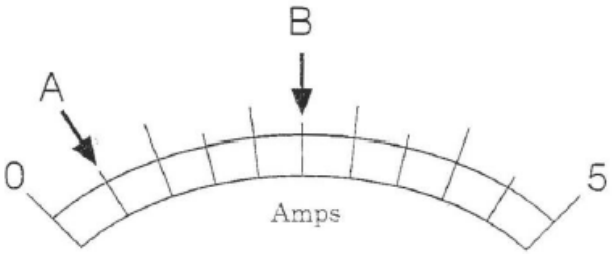


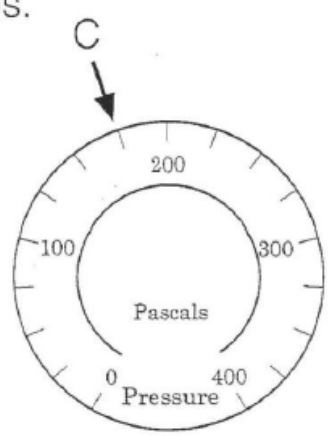


Exercise 3

Question 2

Read the measurements on these scales.



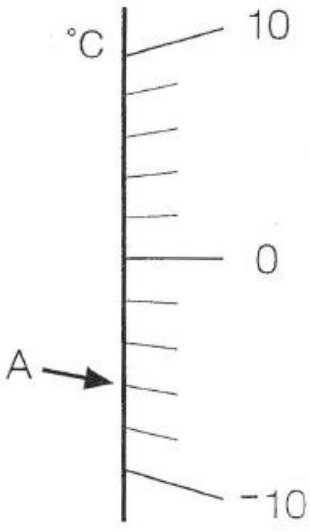


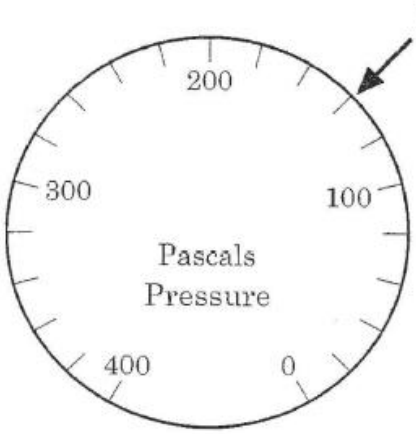
A = ...

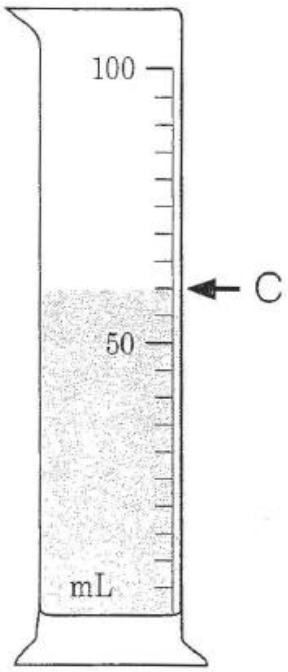
B = ... C = ...

Question 3

Read the measurements on these scales.







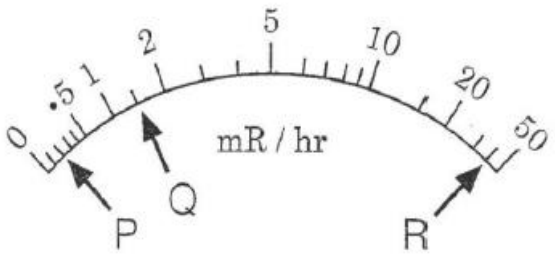
B = ...

A = ... C = ...

Exercise 3

Question 4

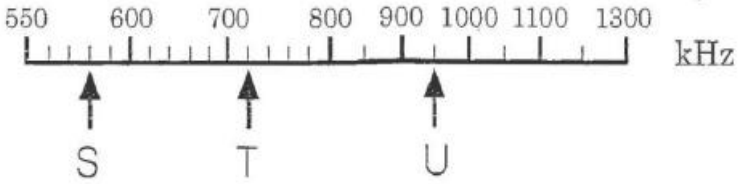
A non-uniform scale goes up in unequal steps.
Take special care when reading these.



P = ...

Q = ...

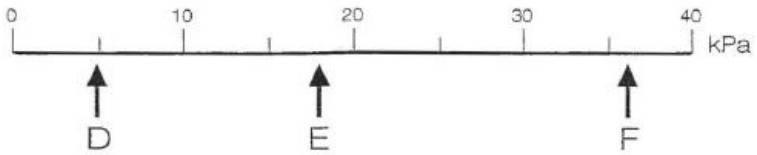
R = ...



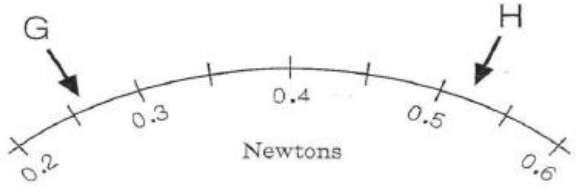
S = ... T = ... U = ...

Question 5

Estimate the reading of the pointers.



D = ... E = ... F = ...



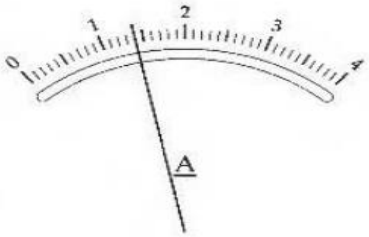
G = ... H = ...

Question 6

Extension Question Use your answers to the scale reading exercises on the next page to solve the storm cloud puzzle by decoding the answer given at the end of the exercise.

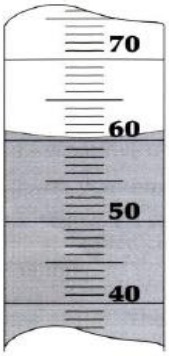
When is a storm cloud not fully dressed?

1 ___ minutes and ___ seconds

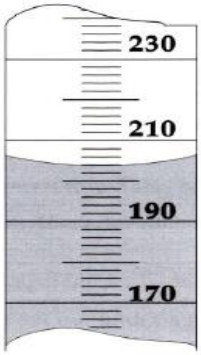


2 ___ amps

3 ___ N

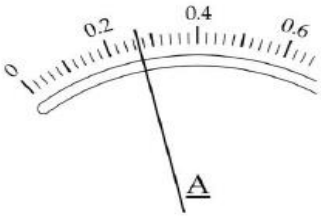


4 ___ mL

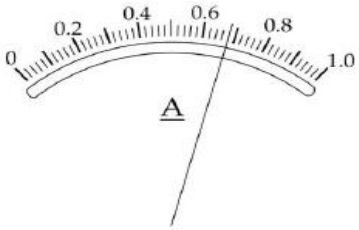


5 ___ mL

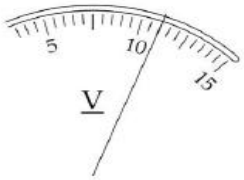
6 ___ °C



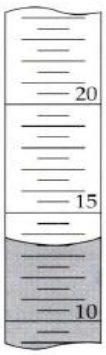
7 ___ amps



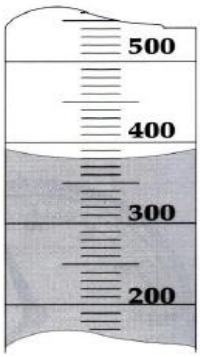
8 ___ amps



9 ___ volts



10 ___ mL



11 ___ mL

[The numbers in the riddle correspond to question numbers. The answer to question 2 is 1.4 amps, which corresponds to the letter R.]

0.235 = F	0.27 = S	0.64 = M	0.68 = T	1.04 = P	(1.4 = R)	3–23 = D
4.25 = W	4.5 = B	11 = U	12 = L	13.5 = I	14 = V	16.5 = J
23 = O	23–4 = G	23.5 = A	27 = Q	60.5 = H	62 = Y	204 = N
206 = C	216 = X	380 = E	390 = Z	420 = K		

When is a storm cloud not fully dressed?

3	4	11	5		10	8		7		10	5		10	8	7

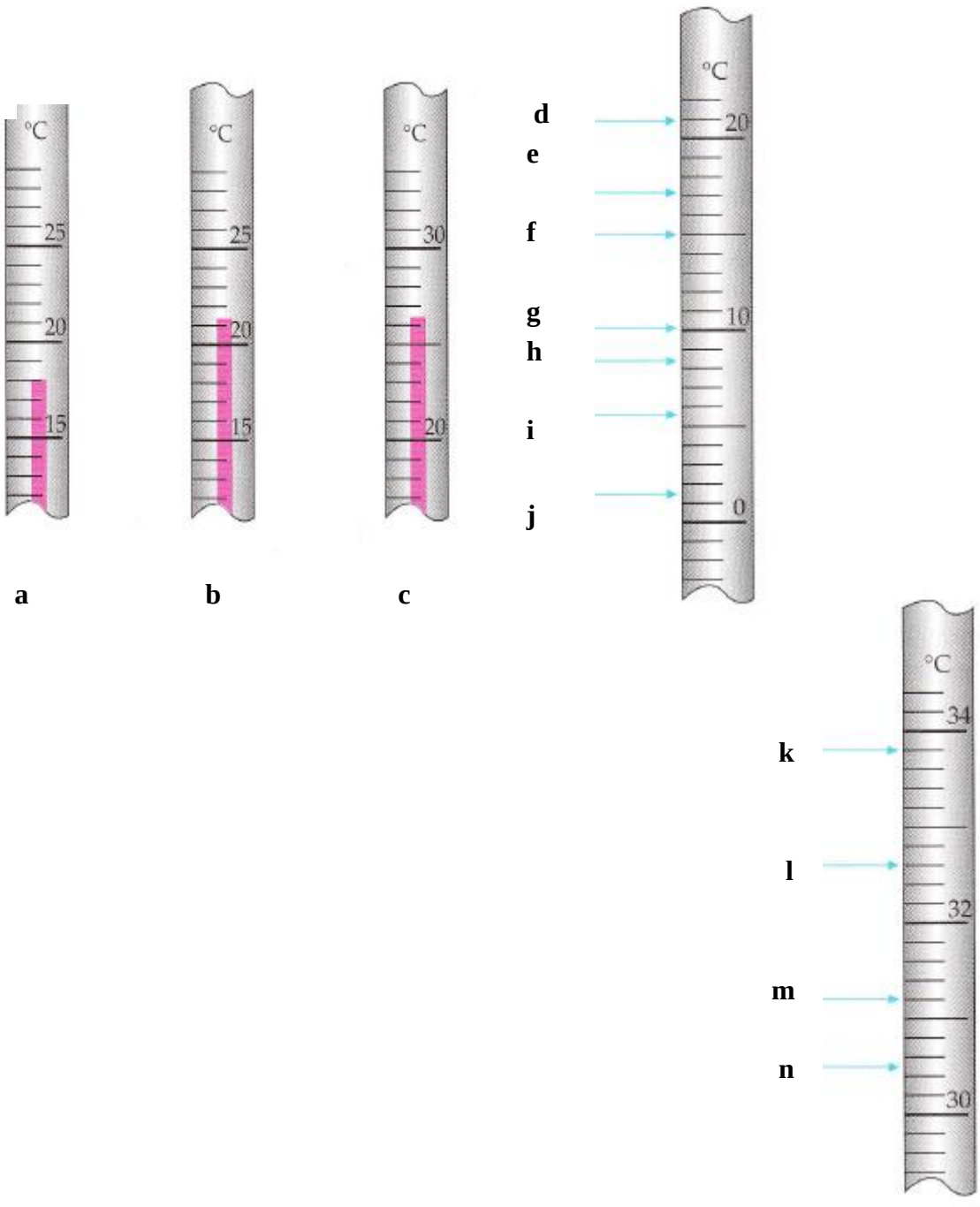
8	4	9	5	1	11	2	3	11	6	2
						R				R

Wignall, A., Wales, T., & Gillman, M. (1999). *Year 10 science assignments*. Auckland: Pearson Education.

Temperature is measured in degrees Celsius, °C (also called degrees Centigrade).
Another temperature scale measures temperature in degrees Fahrenheit, °F.
Water freezes at 0 °C.
Water boils at 100 °C.
Comfortable room temperature is about 20 °C.
Swimming pool water is about 28 °C.
Our normal body temperature is 37 °C.

Question 7

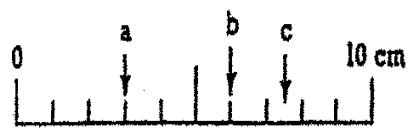
Read the temperatures shown here:

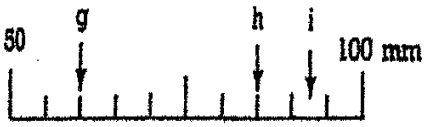


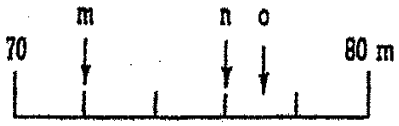
Exercise 4

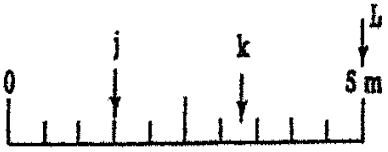
Question 1

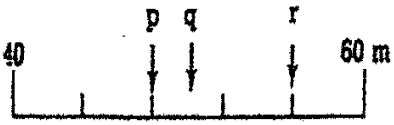
Read the following scales:



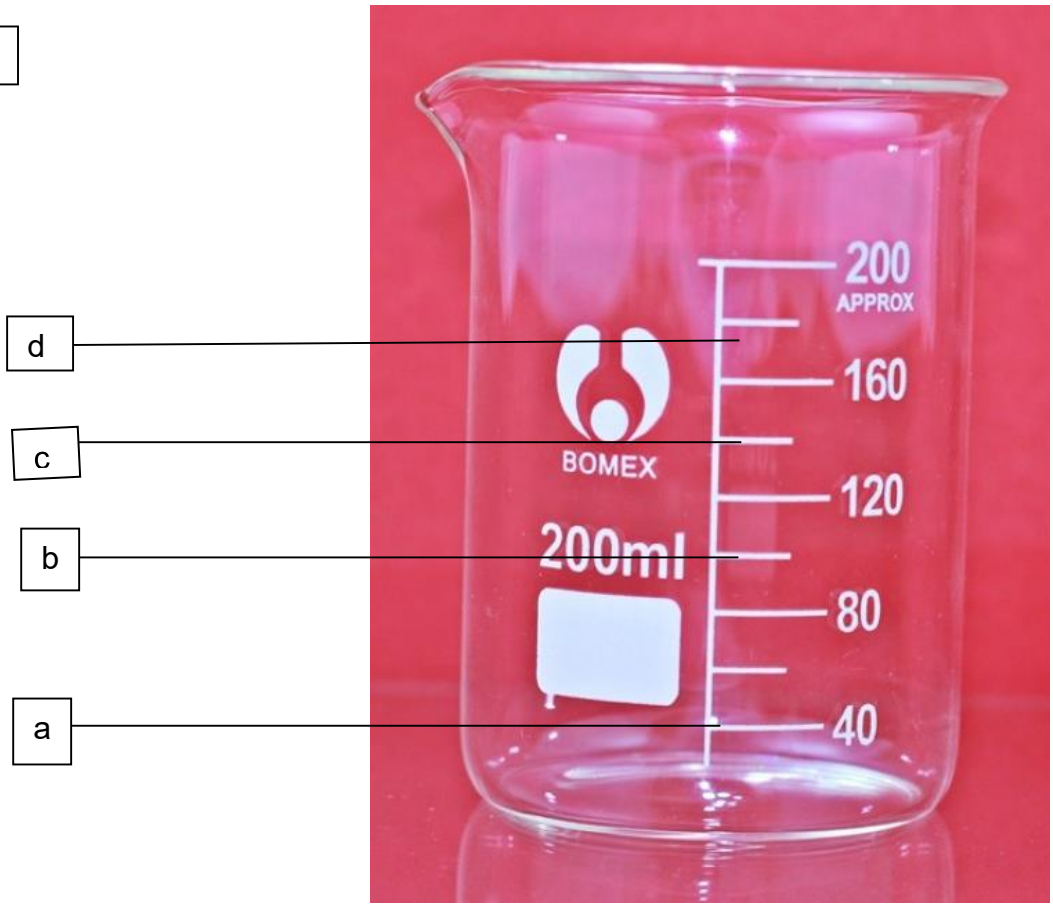








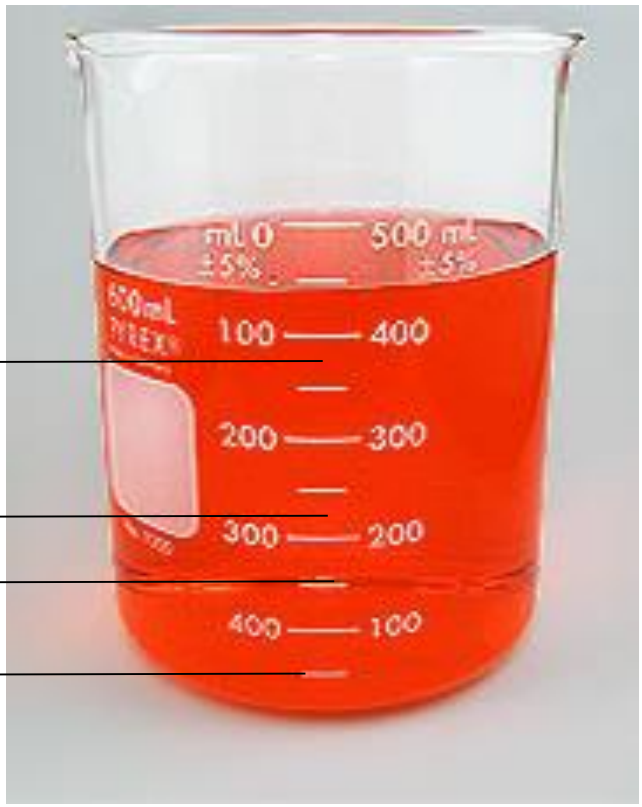
Question 2



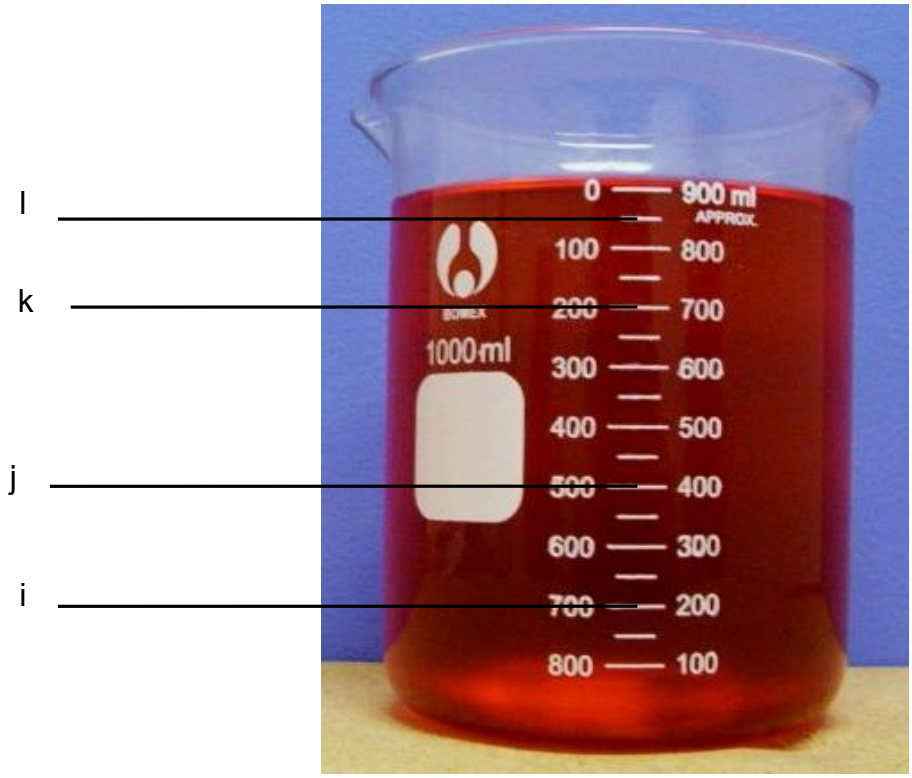
Some beakers have two calibration scales.
One scale shows how much liquid is inside the beaker measured up to the callibration mark.
The other scale shows how much liquid has been poured out from the 500mL level.

For the exercises below state the volume inside the beaker if it is filled to the level shown:

Exercise 4, Question 2 continued

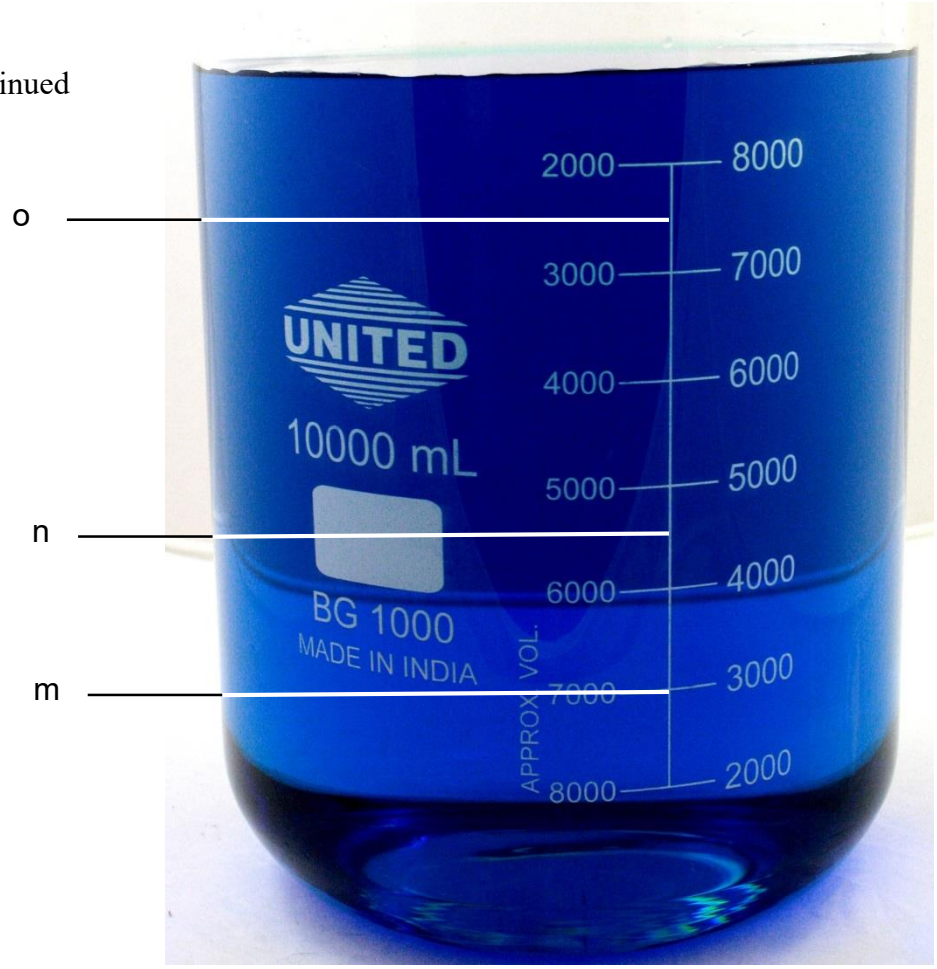


State the number of **litres emptied out** of the beaker which had 900mL of liquid if it is filled to the level shown:



State the volume, in **litres**, **inside** the beaker if it is filled to the level shown:

Exercise 4, Question 2 continued



p How much does this fruit weigh? (use metric measure)

Question 3

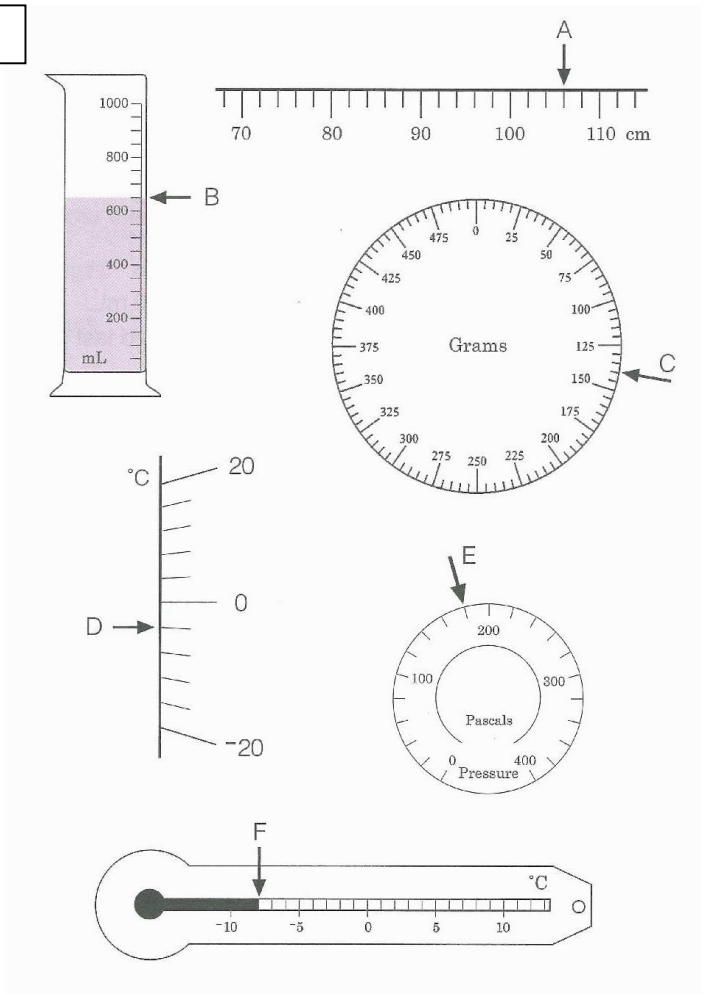
Exercise 4

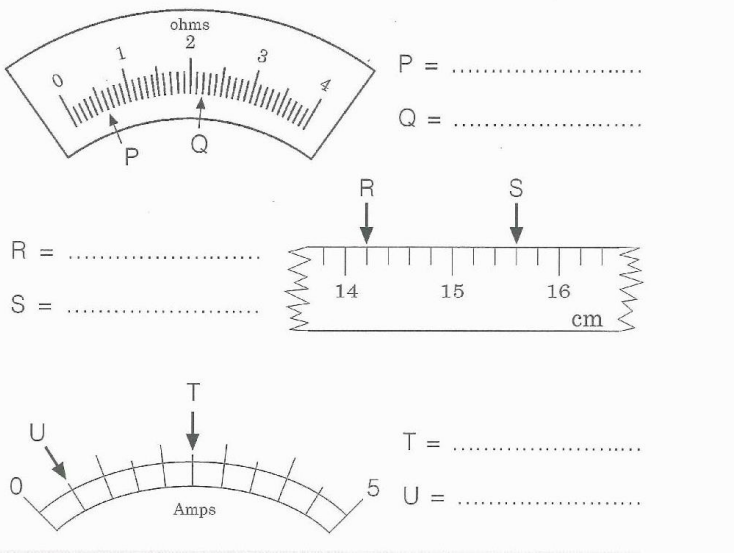
Give the metric reading shown by each of these arrows:

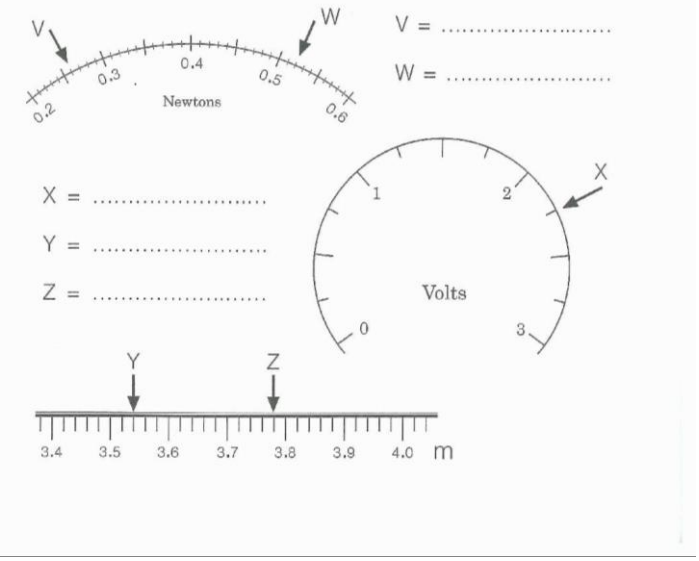
Give your answer in grams and then convert to state the equivalent number of kilograms.

Exercise 4

Question 4





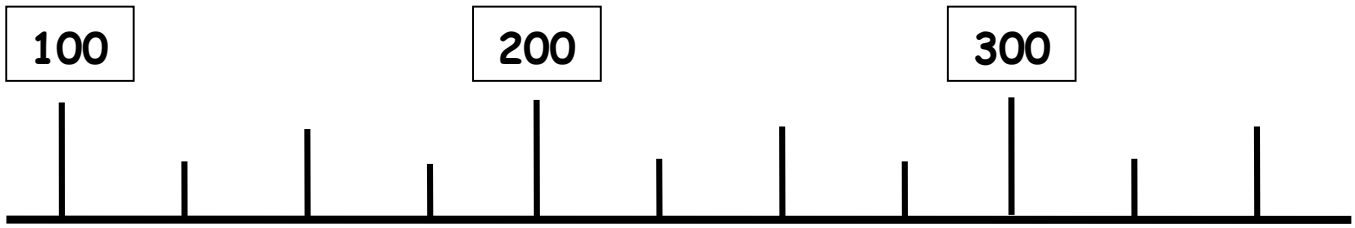


Exercise 4

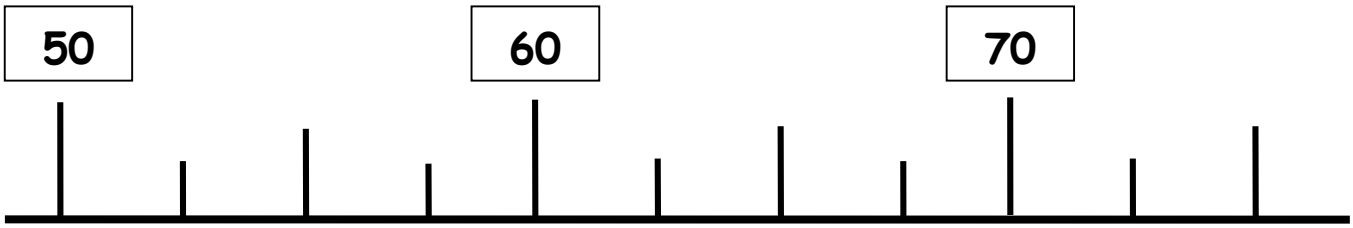
Question 5

Mark the following numbers on the scales shown (Scales in questions 1-3 are in kg).

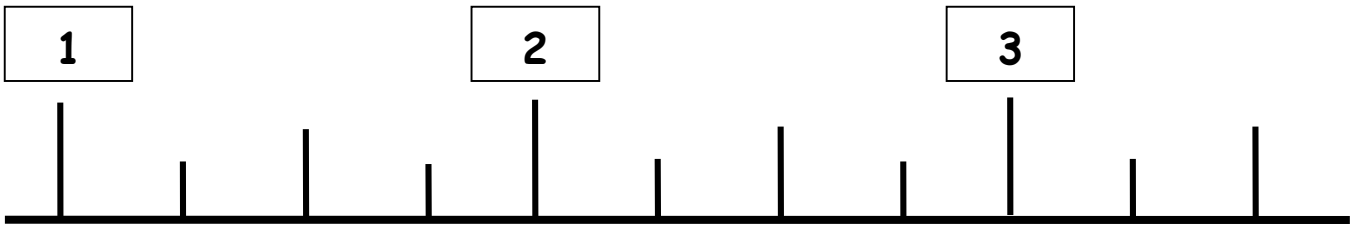
A. a) 150kg b) 225kg c) 280kg



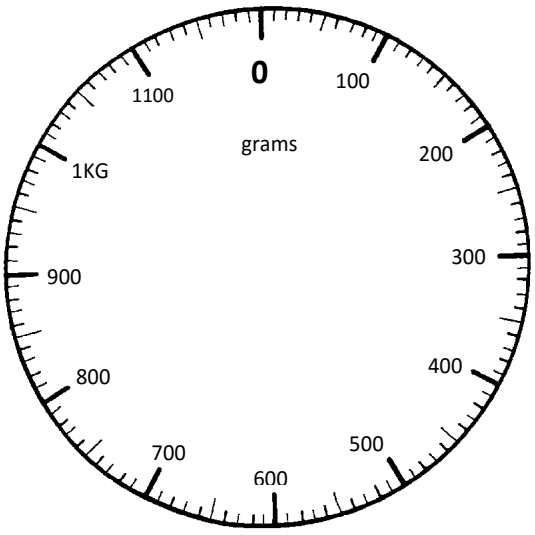
B. a) 65kg b) 57kg c) 72kg



C. a) 2.25kg b) 1050g c) 2750g



D. a) 220g b) 0.75kg c) 1.08kg d) 1.14kg



Parts of a syringe

A syringe consists of a barrel, plunger, and a tip.

- Barrel: a hollow cylinder holding medication. The barrel has calibrations (markings) on the outer surface.
- Plunger: fits in the barrel and is moved back and forth. Pulling the plunger back draws in medication or air into the barrel. Pushing the plunger in forces out the barrel contents.
- Tip: the end of the syringe holding the hub of the needle, often held in with a Leur-Lock tip.

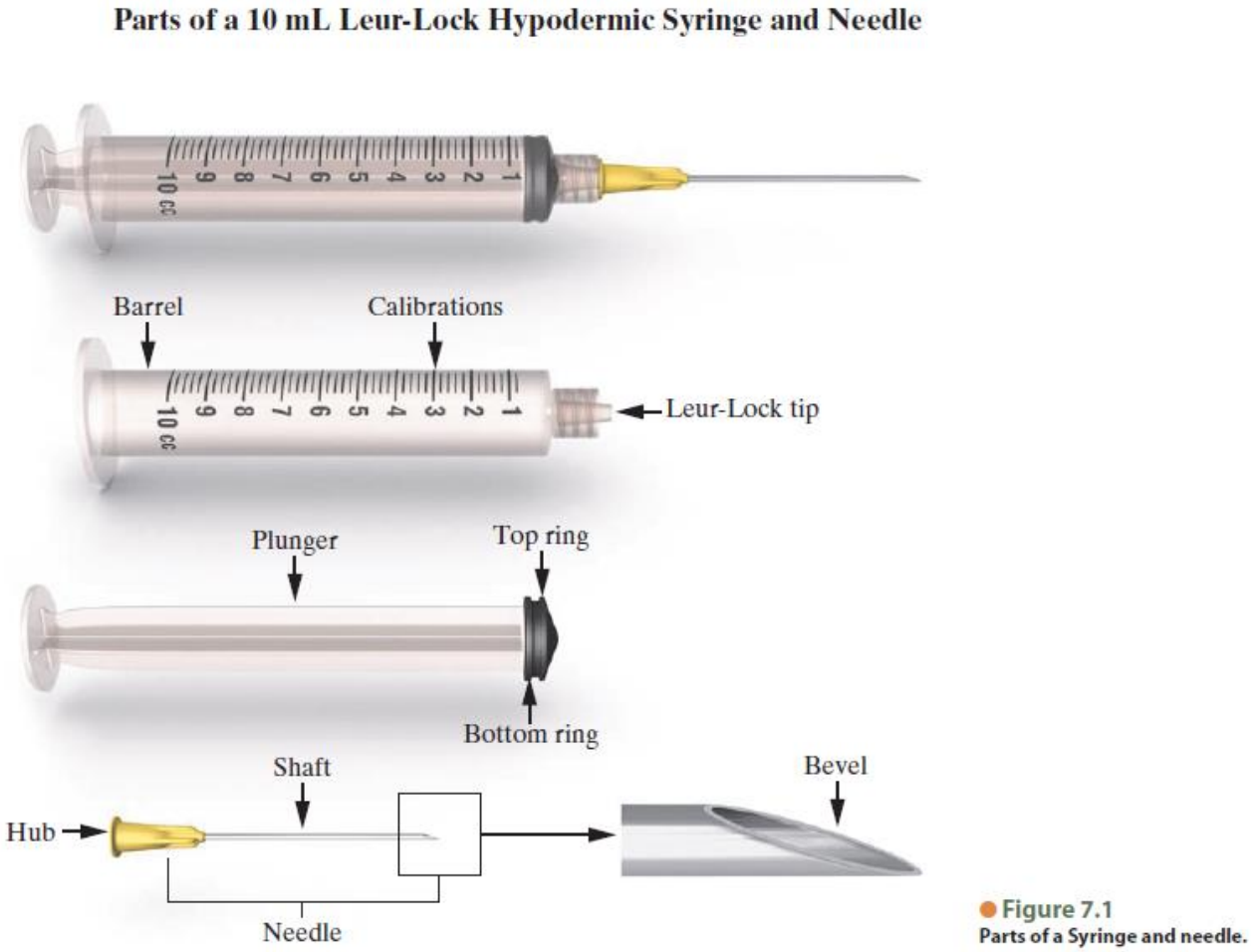


Figure 7.1
Parts of a Syringe and needle.

- From Olsen, Giangrasso and Dillon "Medical Dosage Calculations" 9th edition, Published by Prentice Education Chapter 7

This website has syringe reading practice
http://wps.prenhall.com/chet_olsen_medicaldosage_9/
Syringe images here and in Ex 12 & Ex 13 are from this site.

The liquid volume in a syringe is *read from the top ring*, not the bottom ring, nor from the raised section in the middle of the plunger.

This syringe has 0.9mL

(images from Olsen, Giangrasso and Dillon "Medical Dosage Calculations" 9th edition, Published by Prentice Education Chapter 7

This syringe below has 5.4mL

The syringe below has 4.4 mL

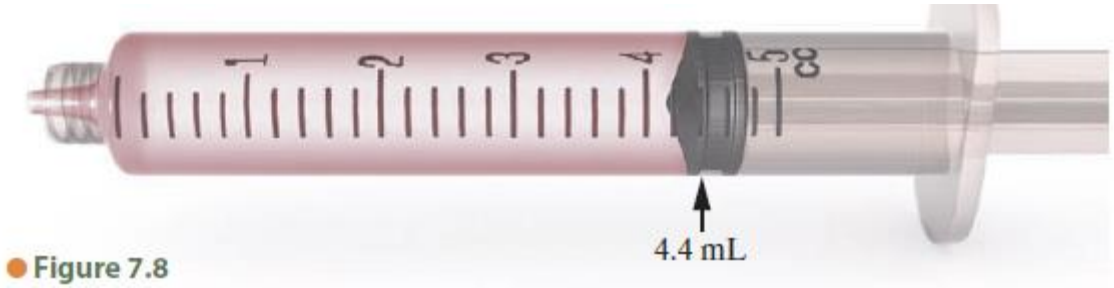
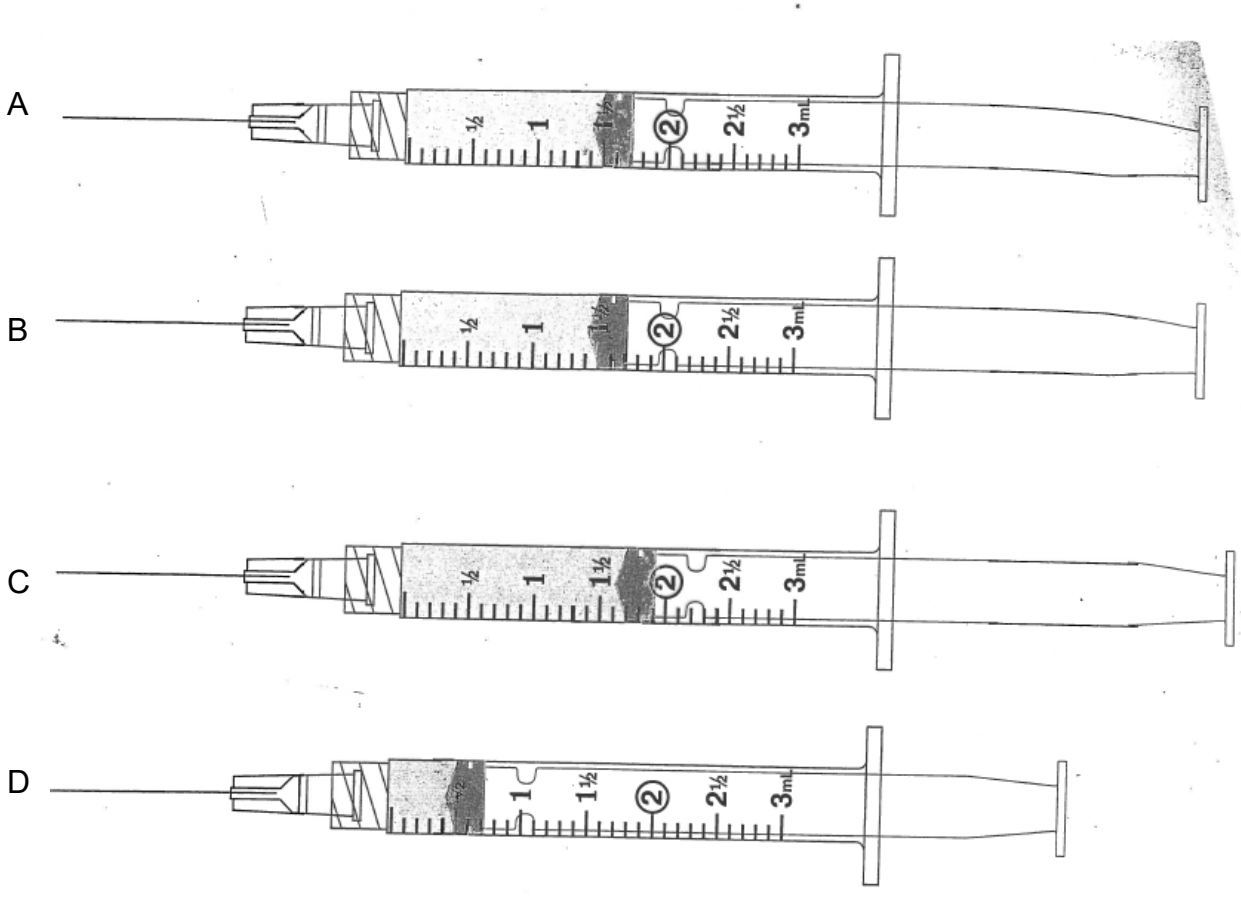


Figure 7.8

Exercise 5

Read the amount in each syringe



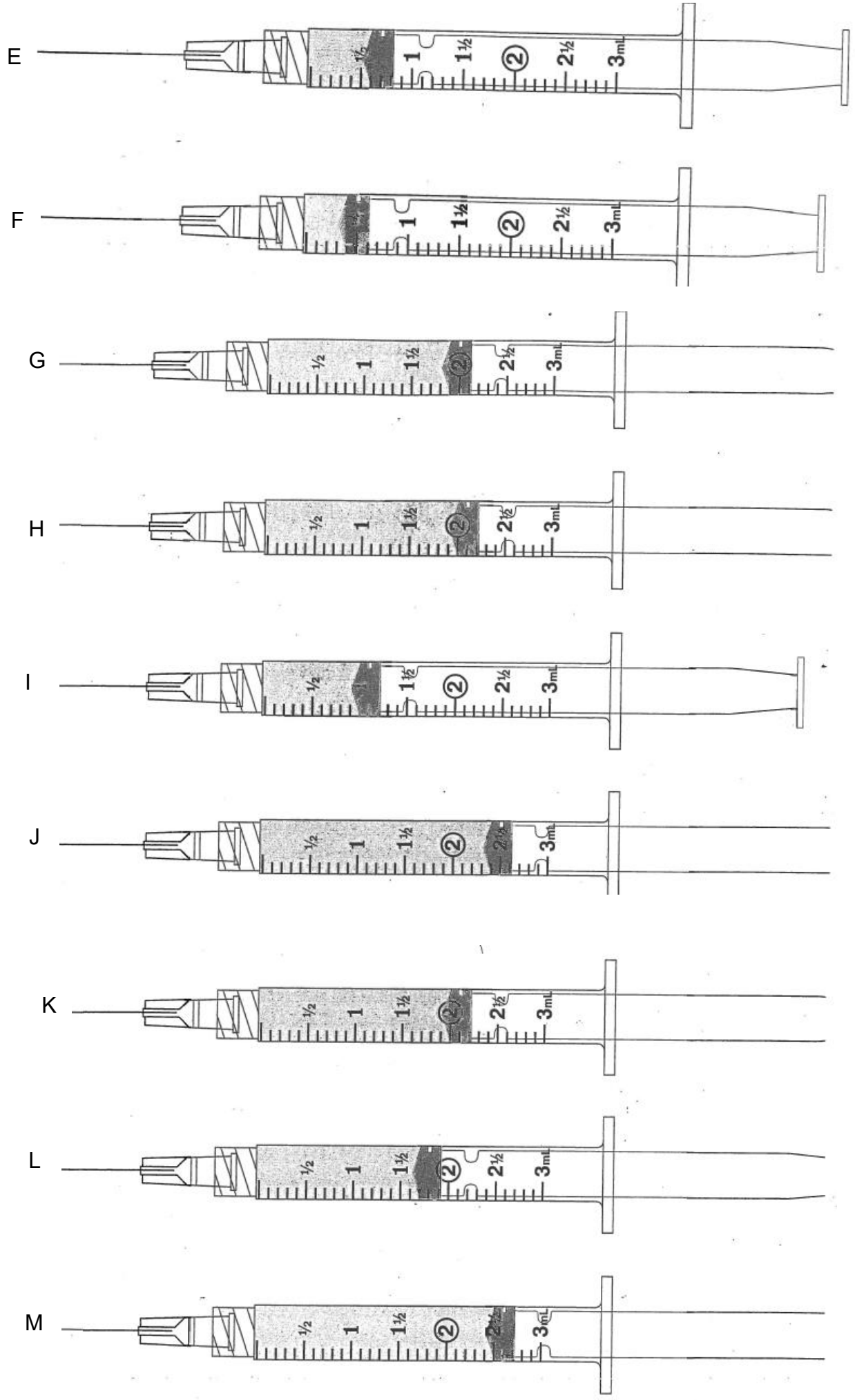

E
F
G
H
I
J
K
L
M

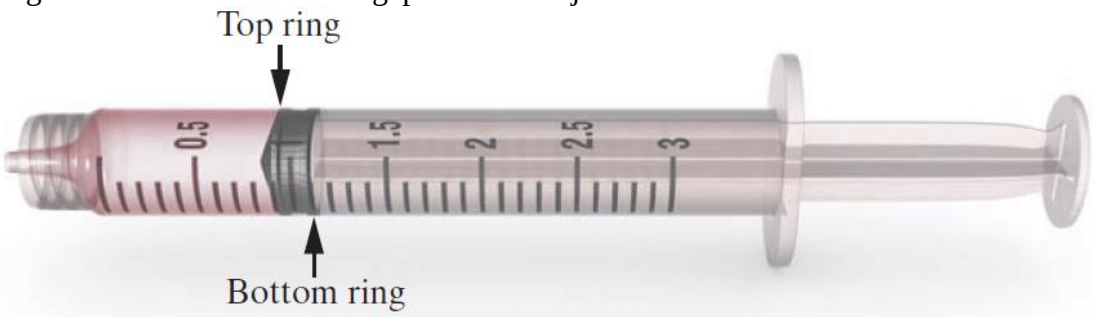
Figure 7.2
A sample of commonly used hypodermic syringes (35 cc, 12 cc, 5 cc, 3 mL, and 1 mL).

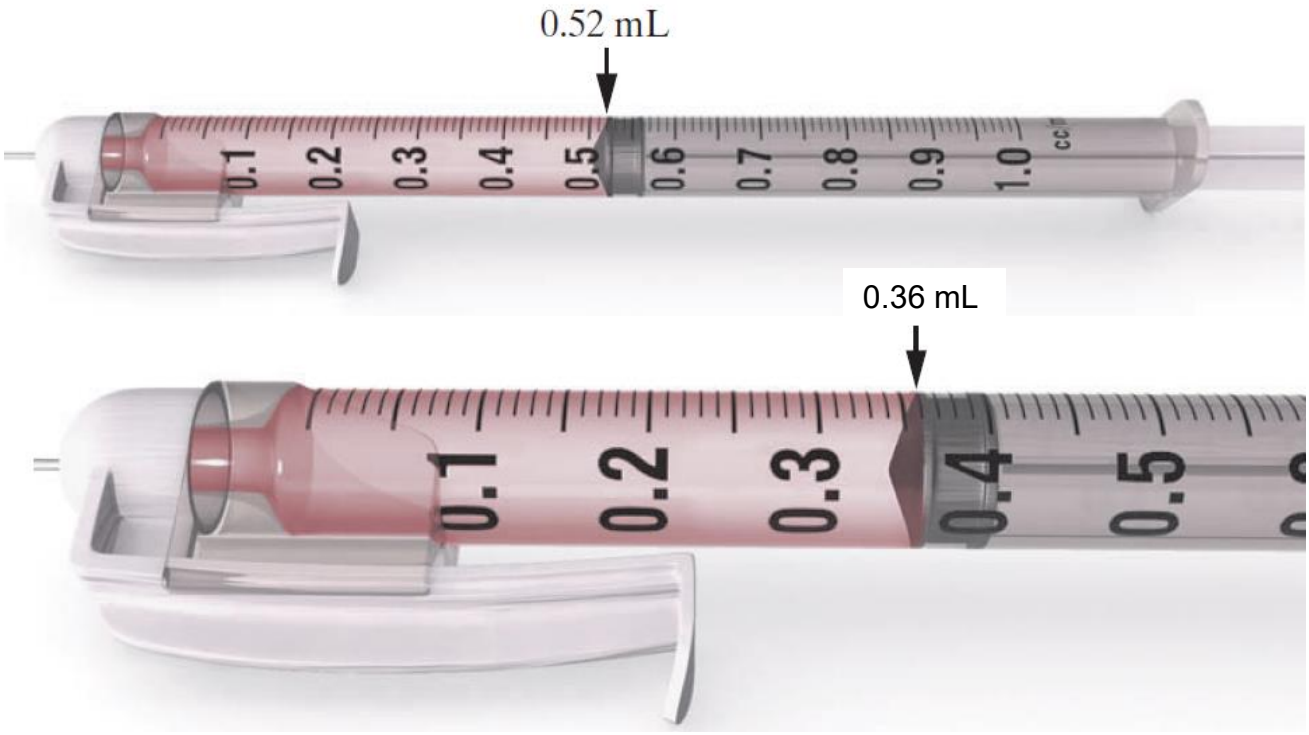
Note that one cc is the same volume as one mL
cc is the abbreviation for cubic centimetre.
One cc is a little cube with each side measuring 1 cm long. If the cube was an empty box it would hold 1mL of liquid.

Exercise 6
Use the syringes above to complete this table:

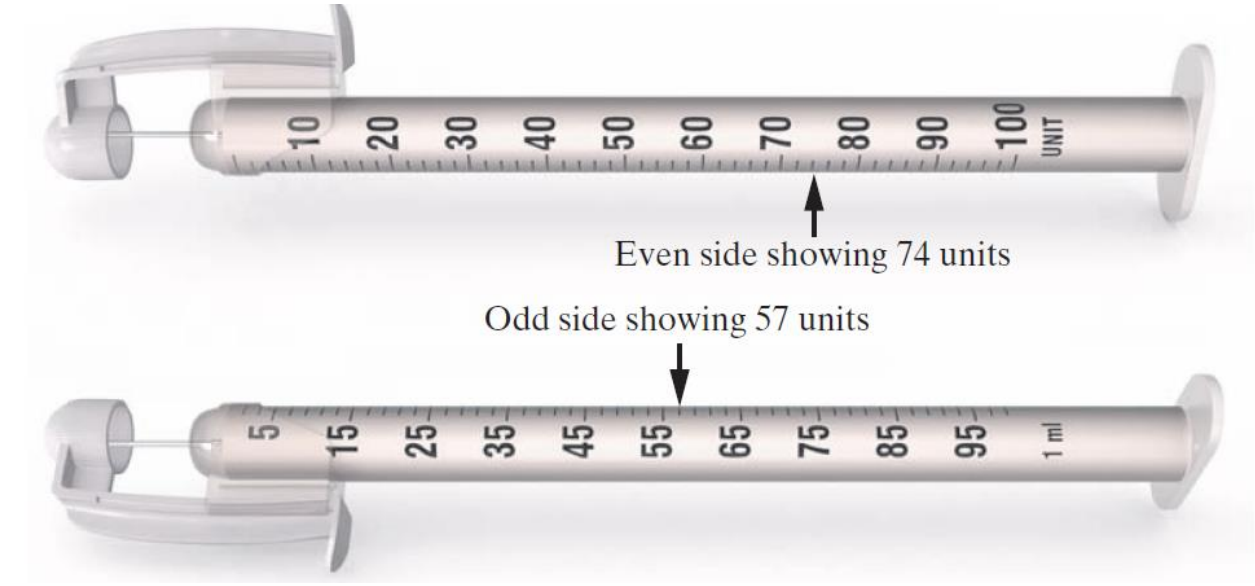
Syringe size	35 mL	12 mL	5 mL	3 ml	1 mL
Gap between calibration lines					

This syringe contains 0.9mL as each gap between adjacent small calibration lines is 0.1mL





The hormone insulin, used to treat patients with diabetes, is administered in very small doses. The insulin syringe delivers units of insulin. The most commonly used concentration of insulin has 100 units of insulin in 1 mL. To help deliver the correct small dose sometimes dual-scale syringes are used: one syringe delivers a dose given as an "even number" while another syringe delivers an "odd number" of units of insulin. Each calibration line represents 2 units of insulin.



This lo-dose insulin syringe delivers doses under 30 units. Each calibration line represents 1 unit.

Sometimes a single scale insulin syringe is used.

This syringe has 72 units of insulin.

Exercise 7

Show the correct syringe dose for each of these:

1. 0.72 mL

2. 6.8 mL

3. 2.8 mL

4. 4.4 mL

5. 0.62 mL

6. 28 units

7. 3.6 mL

8. 1.4 mL

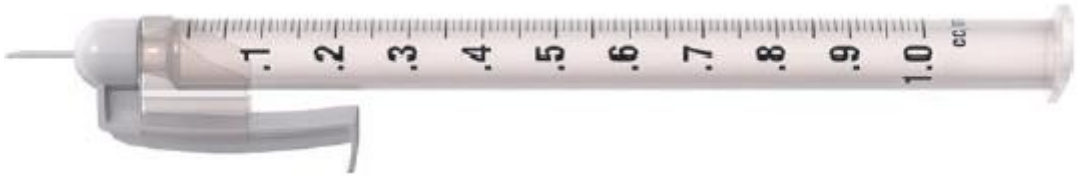
9. 13 mL

10. 9.6 mL

11. 32 units

12. 56 units

13. 0.37 mL



14. 51 units

15. 6.6mL

16. 0.72mL

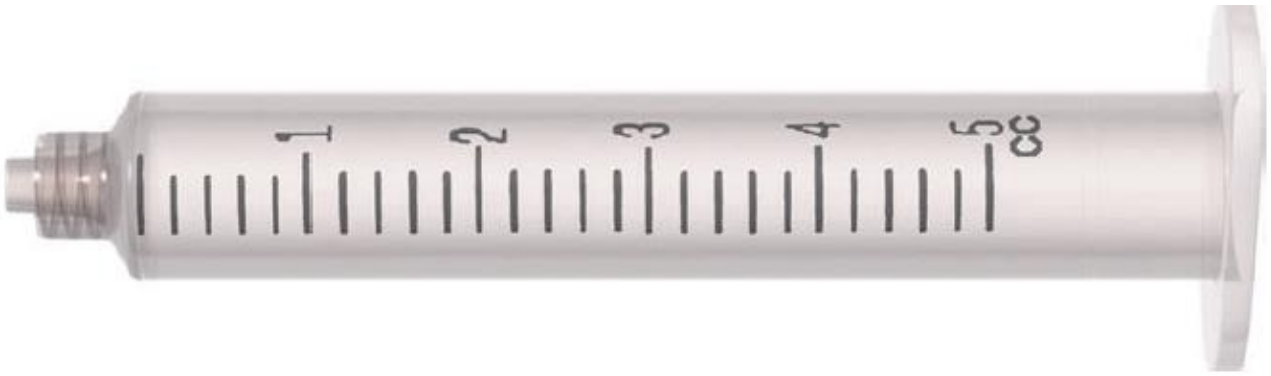
17. 8.2mL

18. 27mL

19. 42 units

20. 14 units

21. 3.6 mL



22. 1.8 mL

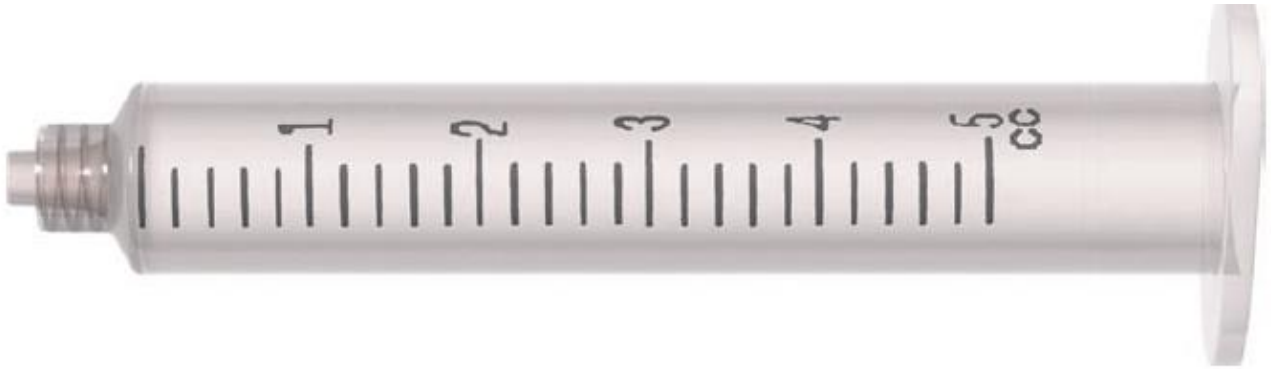
23. 7.2 mL

24. 16 mL

25. 12 units

26. 0.35 mL

27. 4.4mL



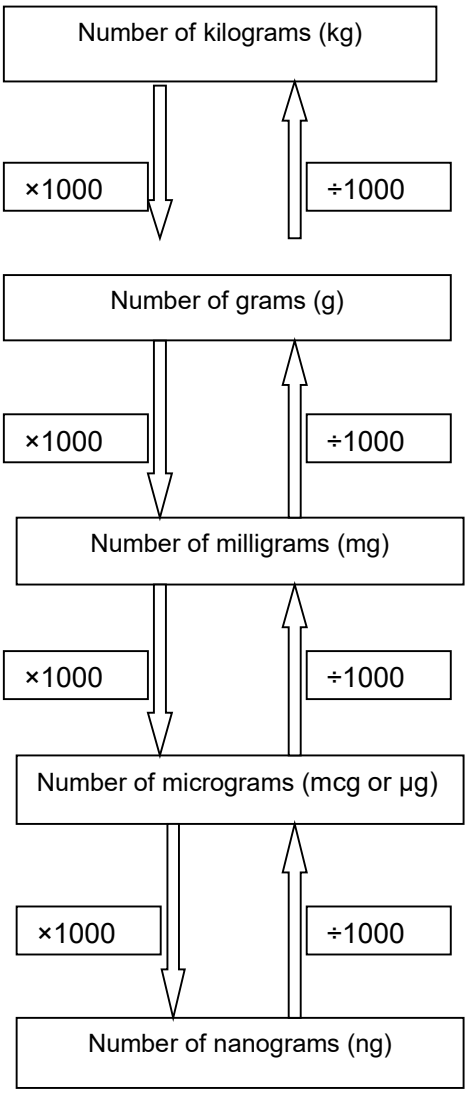
28. 8.8 mL

29. 22 mL

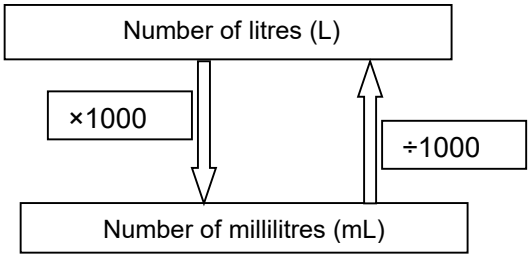
Measurement: **METRIC MEASUREMENTS OF WEIGHT**

Name	Abbreviation	Notes
kilogram	kg	Approx. the weight of a litre of water
gram	g	One thousand grams makes one kilogram
milligram	mg	One thousand mg makes one gram
microgram	mcg or µg	One million mcg makes one gram
nanogram	ng	One thousand ng makes one mcg

Conversion Chart - weight



Conversion Chart – liquid capacity



Measurement : **METRIC CONVERSIONS**

Exercise 8

1. (a) 1 gram = _____ milligrams (e) 1 centimetre = _____ millimetres

(b) 1 milligram = _____ micrograms (f) 1 metre = _____ centimetres

(c) 1 litre = _____ millilitres (g) 1 kilometre = _____ metres

(d) 1 kilogram = _____ grams (h) 1 microgram = _____ nanograms

2. (a) To go from a bigger unit to a smaller unit you want a _____ (bigger/smaller) number so you need to _____ (multiply/divide)

(b) To go from a smaller unit to a bigger unit you want a _____ (bigger/smaller) number so you need to _____ (multiply/divide)

Key Concept 2: Measurement Conversions

1. Find the scale factor (How many --- in a ----?)
2. Decide whether you need to multiply or divide: Do you need more or less?

Remember:

The bigger the unit, the less you need

or

The smaller the unit the more you need

Do pages 15 and 17 of Nursing Calculations

Some measurements of interest

Mass 1 tonne = 1000kg **Area** 1 hectare (ha) = 10 000 m^2

Metric measurements

1 teaspoon = 5mL
1 dessertspoon = 10 mL
1 tablespoon = 15 mL (but in Australia 1 tablespoon = 20 mL) 1 cup=250mL

Liquid Measurements

1 decilitre = 100mL
1Litre = 10decilitres
1mL = 1 cm3
1 L = 1000 mL = 1000 cm3
From http://en.wikipedia.org/wiki/Cooking_weights_and_measures

Some students like to use the "King Henry" method for metric conversions. Look on you tube for a video showing this method.
https://www.youtube.com/watch?v=vaAthKSdepU

King Henry, a mnemonic for remembering unit conversions

Units become larger in size ⟵ ⟶ Units become smaller in size

	-	-	**King**	**Henry**	**Died**	**Unusually**	**Drinking**	**Chocolate**	**Milk**	-	-		-	-	
Mega			**kilo**	**hecta**	**deka**	**Unit**	**deci**	**centi**	**milli**			**micro**			**nano**
M			k	H	D		d	c	m			μ (or mc)			n
eg Mg Mm ML			eg Kilogram Kilometre kilolitre	eg Hectagram Hectametre Hectalitre	eg Dekagram Dekametre Dekalitre	eg gram metre litre	eg decigram decimetr e decilitre	eg centigram centimetre centilitre	eg milligram millimetre millilitre			eg μg or mcg μm μL			eg ng nm nL
1Mg = 1 million grams 1,000,000g			1Kg = 1 thousand grams 1000g	1 Hg = 1 hundred grams 100g	1 Dg = ten grams 10g	1g	1 dg = a tenth of a gram $\frac{1}{10}$ 0.1g	1 cg = a hundredth of a gram $\frac{1}{100}$ 0.01g	1 mg = a thousandth of a gram $\frac{1}{1000}$ 0.001g			1 μg = a millionth of a gram $\frac{1}{1000000}$ 0.0000001g			1 ng = a billionth of a gram $\frac{1}{1000000000}$ 0.000000001g
						1g 1L	10 dg = 1 g 10 dL = 1L	100 cg = 1 g	1000 mg = 1 g			1 million μg = 1 g			1 Billion ng = 1 g

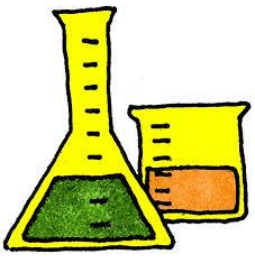
Remember:

⟵ **When converting <u>to the bigger size unit</u>, the less you will have, so divide.**

⟶ **When converting <u>to the smaller size unit</u> the more you will have, so multiply.**

Measurement : **METRIC CONVERSION PRACTICE**

Exercise 9



1. Convert the following into milligrams

a) 6 grams b) 26.8 grams c) 3.924 grams d) 405 grams

2. Convert the following into grams

a) 1200mg b) 650mg c) 6749mg d) 3554mg

3. Convert the following into milligrams

a) 120 micrograms b) 1001 micrograms c) 2675 micrograms d) 12034 mcg

4. Convert the following: (you may find it easier to work out the answers in two stages):

a) 1.67grams into micrograms b) 0.85grams into micrograms

c) 125 micrograms into grams d) 6784 micrograms into grams

e) 48.9 milligrams into nanograms f) 3084 nanograms into milligrams

5. Convert the following into litres

a) 10 millilitres b) 132 millilitres c) 2389 millilitres d) 123.4 millilitres

6. Convert the following into millilitres

a) 4 litres b) 6.2 litres c) 0.94 litres d) 12.27 litres

7. A patient needs a dose of 0.5 g of medicine A. They have already had 360mg.

a) How many more mg do they need?

b) What is this value in grams?

c) A dose of 1400 mcg has been prepared. Will this be enough?

\

Measurement: **MORE METRIC CONVERSION PRACTICE**

Exercise 10

1. Change to millimetres
   (a) 7 cm (b) 1m 7cm (c) 2m 37cm

2. Change to centimetres
   (a) 20mm (b) 150mm (c) 2m 900mm

3. Change to kilograms
   (a) 4500g (b) 5162mg (c) 14608 mcg

4. Change to grams
   (a) 4.2kg (b) 253mg (c) 5960 mcg

5. Change to milligrams
   (a) 2.03kg (b) 52.3g (c) 65 mcg

6. Change to micrograms
   (a) 0.25kg (b) 2.75g (c) 5.65mg

7. Change to litres
   (a) 5205 mL (b) 250 mL

8. Change to millilitres
   (a) 375 L (b) 4.25 L (c) 0.06 L

Exercise 11

1. 258 cm = _____ mm = _____ m
2. 134.02 mm = _____ cm = _____ m
3. 12.41 m + 62 cm + 125 mm =
4. 5.93 m + 8.05 mm + 2.954 m =

Exercise 12

1. 2.3 L + 256 mL + 0.4 L =

2. 58.3 L + 58.3 mL + 1.432 L =

3. 5.525 L – 450 mL – 280 mL =

4. Change to Litres

a) 50 dL b) 10 dL c) 1 dL

d) 5 dL e) 15 dL f) 8 dL

5. Change to millilitres

a) 1 dL b) 15 dL c) 5 dL

e) 0.5 dL e) 0.25 dL f) 10 dL

6. Change to decilitres

a) 100mL b) 350mL c) 36mL

f) 10mL e) 50mL f) 1000mL

7. Change to decilitres

a) 1L b) .75L c) 1.8 L

g) .5L e) 2.5L f) 1.65 L

8. Change to decilitres

a) 250 mL b) 2.5L c) 130 mL

d) 1.75L e) 1.35 L f) 125 mL

Measurement: **MORE METRIC CONVERSION PRACTICE**

Exercise 13

1. 9.843 mg = _____ g = _____ mcg

2. 4.68 kg = _____ g = _____ mg

3. 9376 mcg = _____ mg = _____ g

4. 0.45 kg = _____ g = _____ mg

5. 1.4363 mg = _____ g = _____ mcg

6. 1.4 kg + 2.63 g + 987 mg =

7. 426 mg + 0.5 g + 23.8 mg =

8. 6.7 kg + 41 g + 1.04 kg =

9. 30601 mcg + 483 mg + 1.2 g =

10. 91.8 mg + 1.2 g + 407 mcg =

Measurement: **STANDARD 12 HOUR TIME**

Calculations with time rely on your knowledge that there are 60 seconds in a minute, 60 minutes in an hour and 24 hours in a day.

Standard 12 hour time is either am or pm:

- am goes from midnight to just before midday (12.00 am to 11.59 am)
- pm goes from midday to just before midnight (12.00 pm to 11.59 pm)

Exercise 16

1. Express the following as am or pm time:

   (a) 5 o'clock in the morning

   (b) ½ past 7 at night

   (c) ¼ to 6 in the morning

   (d) ¼ past 10 in the morning

   (e) 12 noon

   (f) 5 to 12 at night

2. How long is it between:

   (a) 5.30 am – 8.00 am?

   (b) 2.25 pm – 3.00 pm?

   (c) 8.00 am – 3.00 pm?

   (d) 7.30 am – 9.45 am?

   (e) 4.15 pm – 5.45 pm?

   (f) 11.55 pm – 1.10 am?

   (g) 10.45 am – 12.30 pm?

   (h) 4.30 pm – 6.05 am?

3. Judy entered a race that started at 8.45 am. She finished 3 hours and 16 minutes later.
   What time did she finish? _____ am/pm

4. A bus due to arrive in Hamilton at 3.15 pm is 26 minutes early.
   When does it arrive? _____ am/pm

5. A Health Science exam takes 1 hour 45 minutes. If it finishes at 2.20 pm, when did it start?
   _____am/pm

Measurement: **24 HOUR TIME**

24-hour time starts with 0000 hours (midnight) and ends at 2359 hours (one minute before midnight).

Note that 24-hour time always has 4 digits; the first 2 digits state the hours while the following 2 digits show the minutes.

Standard 12-hour clock times are either before midday (am) or after midday (pm).

A quick tip: to change a 12-hour clock pm time to 24-hour clock times add 12 hours to the time.

Examples:
1.00 pm = 1300hours 4.45 pm = 1645hours

24-hour clock	12-hour clock
00:00	12:00 a.m.* midnight (start of day)
01:00	1:00 a.m.
02:00	2:00 a.m.
03:00	3:00 a.m.
04:00	4:00 a.m.
05:00	5:00 a.m.
06:00	6:00 a.m.
07:00	7:00 a.m.
08:00	8:00 a.m.
09:00	9:00 a.m.
10:00	10:00 a.m.
11:00	11:00 a.m.
12:00	12:00 p.m.* noon
13:00	1:00 p.m.
14:00	2:00 p.m.
15:00	3:00 p.m.
16:00	4:00 p.m.
17:00	5:00 p.m.
18:00	6:00 p.m.
19:00	7:00 p.m.
20:00	8:00 p.m.
21:00	9:00 p.m.
22:00	10:00 p.m.
23:00	11:00 p.m.
24:00	(midnight)* (end of day)

Table on left from http://en.wikipedia.org/wiki/24-hour_clock

Exercise 17

1. Write the following in 24hr time:

(a) 2.30 pm
(b) ½ past 3 in the morning
(c) 12 noon
(d) 11.45 pm
(e) 5 to 12 at night
(f) 9.15 am

2. Write the following in am/pm time:

(a)0600hours
(b)1313hours
(c)1045hours
(d) 0935hours
(e) 1855hours
(f) 2255hours

3.A plane leaves Auckland at 0915 hours and arrives in Dunedin at 1125 hours.
How long does the flight take?

4.The Pasifika Parade starts at 1145 hours and finishes at 1325 hours.
How long does the parade take?

5.You finished work at 2125 hours and started 8 ½ hours earlier.
What time did you start?

_____ Hours _____ am/pm

MEASUREMENT

Time Conversions

Remember, unlike metric units, time is not based on 10's, 100's and 1000's.

1 minute = 60 seconds

1 hour = 60 minutes

So to convert between seconds, minutes and hours we are multiplying or dividing by 60.

Example: Convert 270 minutes to hours.

270 ÷ 60 = 4 remainder 30 i.e. 4 hours 30 minutes.

30 is ½ of 60 so

270 minutes = 4½ hours or 4.5 hours

Example: Convert 2.3 hours to minutes.

2 × 60 = 120 minutes in 2 hours and

0.3 × 60 = 18 minutes so

2.3 hours = 138 minutes

Example: Convert 42 seconds to minutes.

Remember 0.1 minute = 6 seconds (0.1 × 60)

So 42 seconds = 7 × 6 seconds = 7 × 0.1 minute = 0.7minutes

Exercise 18: Re-write these times in units in brackets:

1. 4 hours (minutes)
2. 25 minutes (seconds)
3. 2.5 hours (seconds)
4. 30 minutes (hours)
5. 1 hour 20 minutes (hours)
6. 2 hours 33 minutes (minutes)
7. 0.8 hours (minutes)
8. 3.6 hours (minutes)
9. 144 minutes (hours)

FRACTIONS

INTRODUCTION TO FRACTIONS

Key Idea:

Fractions involve part-whole thinking. Fractions describe the part (or portion) out of the whole amount.

This idea is explored in the exercise below:

Exercise 19

Find out the following and then write them as a fraction of the whole class:

Write down the fraction of the class who:

are left handed

speak at least two languages

have a child or children

have no siblings

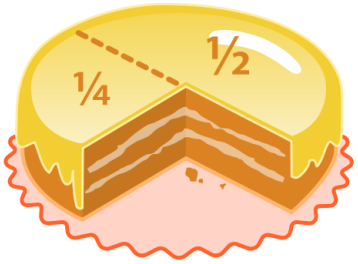
are over 25 years old

know what kind of nursing they want to go into, e.g. paediatric, vet nursing, community

do not wish to be a nurse

went to sleep last night before 11pm

FRACTIONS



INTRODUCTION TO FRACTIONS (cont)

Key Ideas:

- A fraction is part of a whole

$\frac{3}{4}$

The top number shows how many pieces we have of the whole pie. Here, we have 3 pieces, or parts. This is called the **numerator**.

The bottom number shows how many pieces there are in the whole pie. Here, the whole is split into 4 pieces, or parts. This is called the **denominator**.

Images on this page from http://www.bbc.co.uk/skillswise/factsheet/ma17frac-e3-f-what-do-the-numbers-in-fractions-mean

- The larger the denominator, the more pieces the whole is split up into. For example, if a pizza is divided into four pieces each one quarter, each piece of it will be a lot bigger than each piece of a pizza divided into ten pieces where each is $\frac{1}{10}$

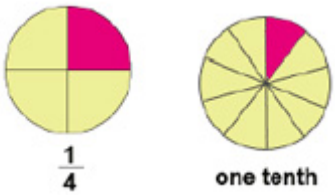
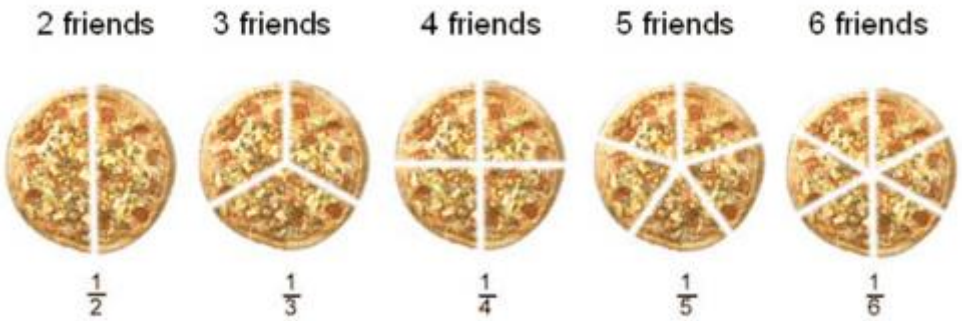


Image from http://www.bbc.co.uk/skillswise/factsheet/ma17frac-e3-f-different-types-of-fractions

For example, the pizzas below have been split up to be shared between:



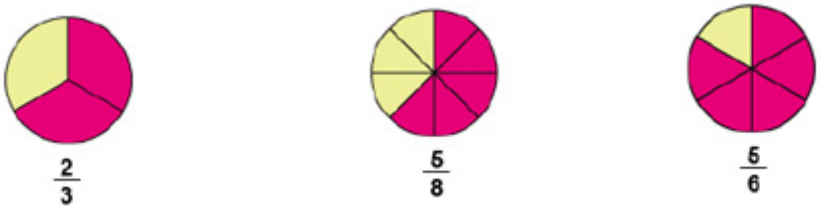
Images from http://www.bbc.co.uk/skillswise/factsheet/ma17frac-e3-f-what-do-the-numbers-in-fractions-mean

You can see here that as the denominator gets larger, your portion (part) of the pizza will be smaller.

INTRODUCTION TO FRACTIONS (cont)

- Usually (but not always) a fraction has a larger number on the bottom than on the top (it is 'bottom heavy').

Examples:



- Equivalent fractions have the same value. Eg $\frac{2}{4} = \frac{1}{2}$ are equal as both fractions are equal amounts of the whole, but they are cut up into different sized portions.

Examples:

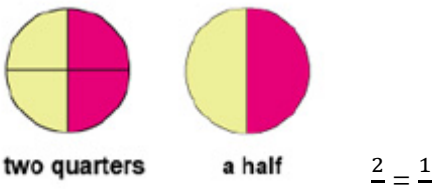


Image from http://www.bbc.co.uk/skillswise/factsheet/ma17frac-e3-f-different-types-of-fractions

- If the numerator (top) and denominator (bottom) are the same, e.g. $\frac{12}{12}$, the fraction is equal to one whole (1 or 1.0).

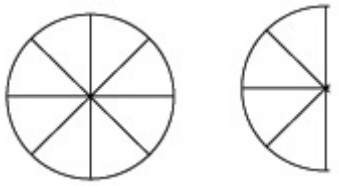
Examples:

$\frac{6}{6}$ = 1 whole $\qquad\qquad$ $\frac{3}{3}$ = 1 whole

Images from http://www.bbc.co.uk/skillswise/factsheet/ma17frac-e3-f-what-do-the-numbers-in-fractions-mean

- If the top is larger than the bottom (top heavy), this fraction is called an improper fraction. An improper fraction can be written as a whole number plus a fraction. This is called a mixed number.

Example:



$\frac{12}{8} = 1\frac{4}{8} = 1\frac{1}{2}$

Improper Fraction $\qquad$ Mixed Numbers

Image from http://www.bbc.co.uk/skillswise/factsheet/ma17frac-l1-f-improper-fractions-and-simplifying

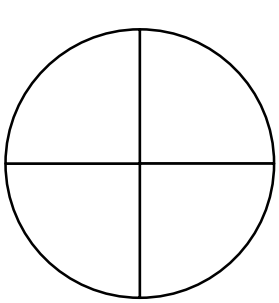
Visit this website for more information on fractions
http://www.bbc.co.uk/skillswise/topic/fractions/resources/l1

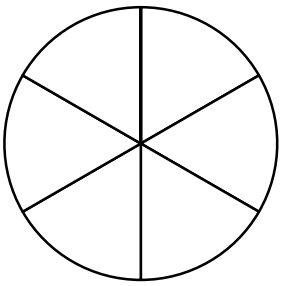
FRACTIONS OF A WHOLE

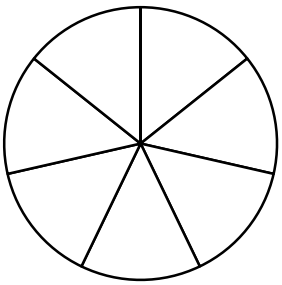
Exercise 20

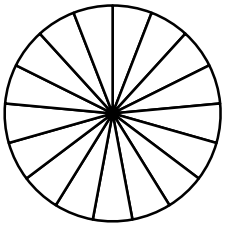
Shade in the following fractions in the appropriate pies:

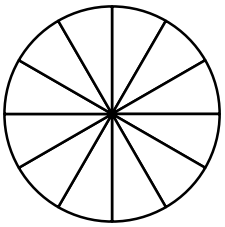
$\frac{3}{4}$ $\frac{3}{6}$ $\frac{3}{7}$ $\frac{3}{12}$ $\frac{3}{17}$ $\frac{3}{27}$

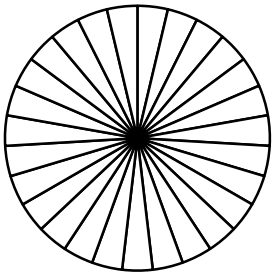








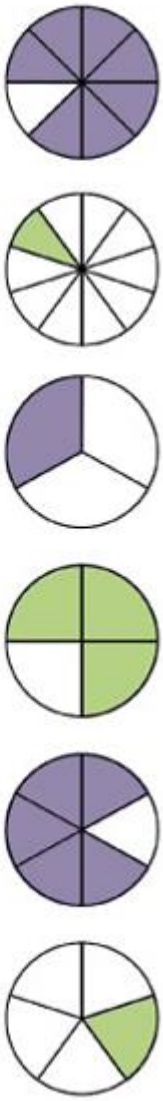




: **FRACTIONS OF A WHOLE**

Match each of these fractions to the correct diagram below:

$\frac{1}{3}$ $\frac{7}{8}$ $\frac{3}{4}$ $\frac{7}{8}$ $\frac{1}{10}$ $\frac{1}{5}$ $\frac{5}{6}$



Now rewrite these fractions in size order from smallest to largest.

Discuss your answers with a classmate.

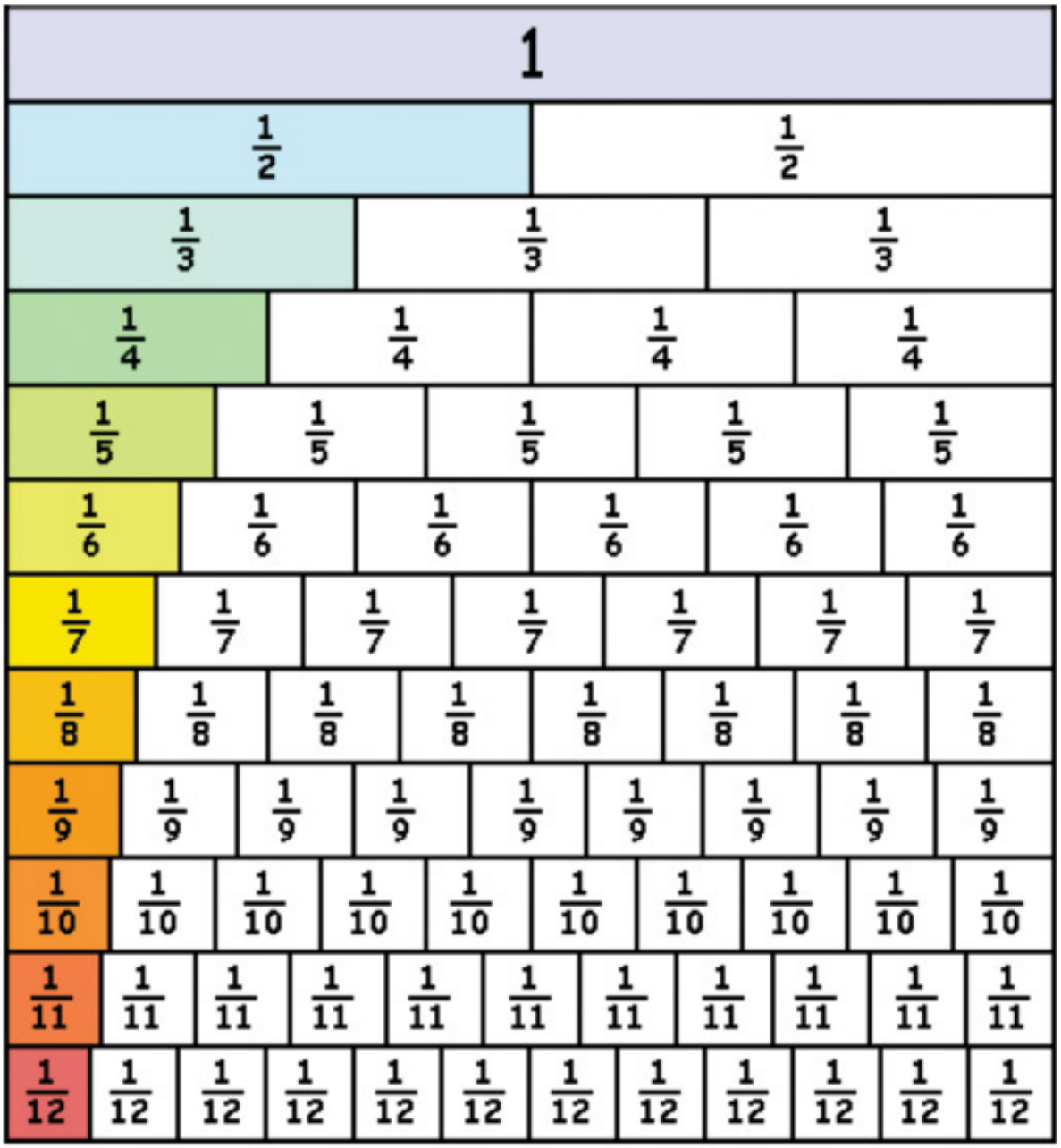
Discuss together how you could modify each diagram to show an equivalent fraction value for each of these fractions.

EQUIVALENT FRACTIONS – Fraction wall

Equivalent fractions have the same value. eg $\frac{2}{4} = \frac{1}{2}$

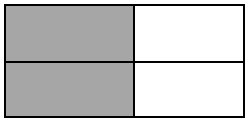
A fraction wall can be used to compare the size of fractions. Work out if $\frac{3}{8}$ is larger smaller or equal to $\frac{4}{10}$

Use the fraction wall to find a fraction which is equivalent to $\frac{4}{10}$



EQUIVALENT FRACTIONS

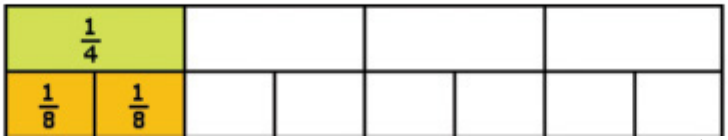
Two fractions are equivalent if they represent the same quantity.
Eg.



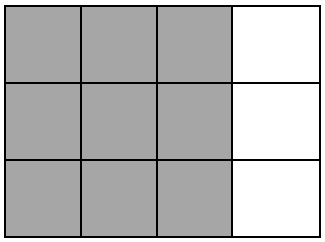
$\frac{1}{2}$ is the same as $\frac{2}{4}$

Note that we can get from $\frac{1}{2}$ to $\frac{2}{4}$ by multiplying both the numerator at the top and denominator at the bottom by 2:

We can compare fractions by putting them next to each other.



The amount shaded is the same in each strip showing $\frac{1}{4}$ has the same value as $\frac{2}{8}$



Likewise ¾ is the same as $^{9}/_{12}$

Note that we can get from ¾ to $^{9}/_{12}$ by multiplying top and bottom by 3:

We can get from one fraction to an equivalent fraction by multiplying or dividing the top and bottom of the fraction by the same number. It does not matter what number we use, if we do the same to the top and the bottom then we have an equivalent fraction.

Key Concept 3: Equivalent Fractions

To change from one fraction to an equivalent fraction we need to multiply or divide the top and the bottom by the **same number**

SIMPLIFYING FRACTIONS

To **simplify** (or "cancel down") a fraction, divide the top (numerator) **and** the bottom (denominator) by the same number.
A fraction is in **simplest form** if it cannot be simplified any further (keeping numerator and denominator as whole numbers).

Example A: – Simplify $\frac{36}{48}$

$\frac{36}{48} \begin{matrix}\div 12 \\ \div 12\end{matrix} = \frac{3}{4}$ (After dividing numerator and denominator by 12)

Or, this may be done in three steps:

$\frac{36}{48} \begin{matrix}\div 2 \\ \div 2\end{matrix} = \frac{18}{24} \begin{matrix}\div 2 \\ \div 2\end{matrix} = \frac{9}{12} \begin{matrix}\div 3 \\ \div 3\end{matrix} = \frac{3}{4}$

Example B: – Simplify $\frac{125}{225}$

$\frac{125}{225} \begin{matrix}\div 5 \\ \div 5\end{matrix} = \frac{25}{45} \begin{matrix}\div 5 \\ \div 5\end{matrix} = \frac{5}{9}$

Or, you could divide $\frac{125}{225}$ by 25 top and bottom in one step: $\frac{125}{225} \begin{matrix}\div 25 \\ \div 25\end{matrix} = \frac{5}{9}$

Tips for Simplifying Fractions

An even number can always be divided by **2**

Any number that ends in 5 or 0 can always be divided by **5** eg $\frac{15}{20} = \frac{3}{4}$

If the numerator (top) and denominator (bottom) both end in zeros, you can cancel one in the numerator for one in the denominator, as many times as possible (ie dividing by 10, 100, ...)

Dividing by 1 is a waste of time – it doesn't change anything!

$\frac{any\ number}{1}$ = that same number on its own eg $\frac{12}{1} = 12$

$\frac{1}{any\ number}$ = remains as it is (is never simplified) eg $\frac{1}{28}$ can not be simplified

$\frac{\text{any number}}{\text{the same number}} = \mathbf{1}$ eg $\frac{10}{10} = 1$

Fractions: **SIMPLIFYING FRACTIONS**

Simplifying a fraction is also called cancelling the fraction.

Work through Nursing Calculations P23, 25, 27 Exercises 1G, 1H, 1I

Exercise 21
Write these fractions in their **simplest form**:

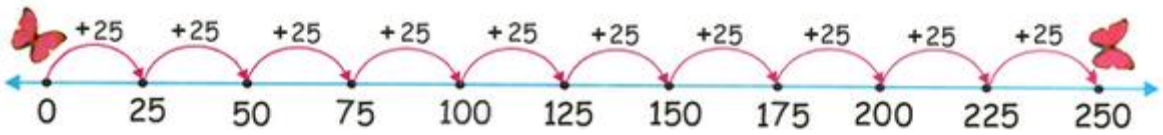
	A	B	C
1.	$\frac{8}{12}$	$\frac{15}{21}$	$\frac{28}{32}$
2.	$\frac{10}{14}$	$\frac{20}{24}$	$\frac{22}{33}$
3.	$\frac{6}{16}$	$\frac{20}{25}$	$\frac{15}{35}$
4.	$\frac{9}{18}$	$\frac{12}{28}$	$\frac{32}{36}$
5.	$\frac{15}{20}$	$\frac{9}{30}$	$\frac{16}{40}$
6.	$\frac{14}{42}$	$\frac{36}{56}$	$\frac{36}{50}$
7.	$\frac{30}{45}$	$\frac{48}{60}$	$\frac{21}{70}$
8.	$\frac{42}{48}$	$\frac{52}{64}$	$\frac{32}{72}$

Key Concept 4: Simplifying Fractions

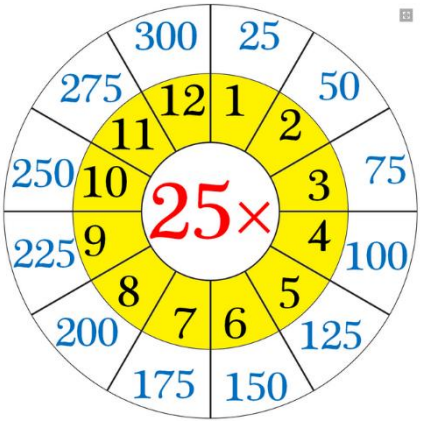
To simplify a fraction, divide the top and the bottom by the same number
Keep simplifying!

Exercise 22

Reduce these fractions to their **simplest form**. (Your 25 times tables will be useful for many).



	A	B	C
1.	$\frac{75}{150}$	$\frac{125}{250}$	$\frac{30}{225}$
2.	$\frac{75}{200}$	$\frac{125}{300}$	$\frac{40}{175}$
3.	$\frac{75}{250}$	$\frac{125}{400}$	$\frac{45}{150}$
4.	$\frac{75}{300}$	$\frac{125}{500}$	$\frac{60}{375}$
5.	$\frac{125}{200}$	$\frac{175}{225}$	$\frac{1000}{1500}$
6.	$\frac{375}{500}$	$\frac{225}{300}$	$\frac{800}{1500}$
7.	$\frac{275}{400}$	$\frac{425}{600}$	$\frac{1250}{1500}$
8.	$\frac{100}{225}$	$\frac{325}{750}$	$\frac{2750}{4000}$



Images from http://www.math-only-math.com/worksheet-on-multiplication-table-of-25.html

SIMPLIFYING FRACTIONS CONTAINING DECIMALS

In general we do not want decimal numbers in a fraction. We get rid of them by multiplying by 10, 100, 1000... to make them whole numbers. This is the same as moving the decimal point to the end of the number, as we do to divide decimals.

Remember, you must do the same decimal point move to both the top and the bottom number.

Example: Simplify $\frac{4}{0.2}$

Get rid of the decimal by multiplying by 10 (moving the decimal point one place to the right):

$4 \times 10 = 40$
$0.2 \times 10 = 2$

Now simplify as usual (divide by 2)

$40 \div 2 = 20$ (= 20)
$2 \div 2 = 1$

Work through Nursing Calculations P 29 Exercise 1J

Exercise 23 Reduce these fractions to their **simplest form**:

	A	B	C
1.	$\frac{0.8}{10}$	$\frac{1.5}{6}$	$\frac{0.08}{20}$
2.	$\frac{1.2}{2.4}$	$\frac{0.05}{0.3}$	$\frac{0.06}{1.8}$
3.	$\frac{1.6}{24}$	$\frac{0.05}{25}$	$\frac{0.012}{3}$
4.	$\frac{0.9}{18}$	$\frac{0.7}{3.57}$	$\frac{7.5}{20}$
5.	$\frac{0.15}{20}$	$\frac{0.09}{150}$	$\frac{0.6}{4}$
6.	$\frac{1.4}{42}$	$\frac{0.36}{3}$	$\frac{4}{6.5}$

Key Concept 5: Simplifying Fractions containing decimals

Get rid of the decimal point by moving it to the end (ie. multiplying by 10, 100….)

Move the decimal point the same number of places in both numbers (ie multiply top and bottom by the same number)!

IMPROPER FRACTIONS & MIXED NUMBERS

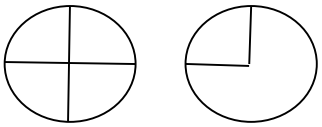
An improper fraction is one that is "top heavy," where the top number is bigger than the bottom number. **This means there is more than one whole. Examples of improper fractions:** $\frac{11}{6}$, $\frac{3}{2}$, $\frac{15}{8}$,

Converting improper fractions into mixed numbers:

Example: **Write $\frac{5}{4}$ as a mixed number.**

A mixed number is a number written as a whole number with a fraction as a remainder.
Examples of mixed numbers: $1\frac{3}{4}$, $2\frac{1}{6}$, $4\frac{5}{8}$

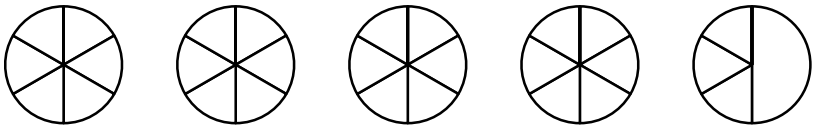
To write $\frac{5}{4}$ as a mixed number, we know that $\frac{4}{4}$ (4 quarters) = 1 whole. Then there is $\frac{1}{4}$ left over, so we know that $\frac{5}{4} = 1\frac{1}{4}$



Example: Write $\frac{27}{6}$ as a mixed number.

Remember $\frac{6}{6}$ = 1 whole. The question is: How many whole things do we have, and what is left over?

If you think of Pizzas cut into sixths. We have 27 sixths altogether. This makes 4 whole pizzas with 3 sixths of a pizza leftover so there are 4 whole pizzas and $\frac{3}{6}$ remainder.
To write this as a mixed number: $\frac{27}{6} = 4\frac{3}{6}$ which should be simplified to $4\frac{1}{2}$

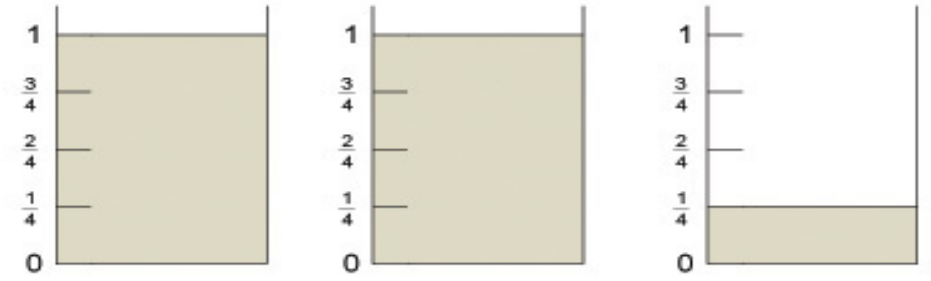


This is the same question as: How many 6's are there in 27, because each group of 6 sixths makes a whole pizza. There are four 6's in 27 with 3 bits left over. So we have 4 whole things and $\frac{3}{6}$ left over.

$$\text{So } \frac{27}{6} = \frac{24}{6} + \frac{3}{6}$$
$$= 4 + \frac{3}{6}$$
$$= 4\frac{3}{6}$$
$$= 4\frac{1}{2}$$

Example of Improper fractions using Litres:

Eight quarters equal two wholes, or two. One more quarter is **nine** quarters, which is two wholes and one quarter left over.



You can write $\frac{9}{4}$ as a mixed number: $2\frac{1}{4}$. This means nine lots of a quarter litres is $2\frac{1}{4}$ litres.

From:
http://www.bbc.co.uk/skillswise/factsheet/ma17frac-l1-f-more-improper-fractions

Key Concept 6: Turning an improper fraction into a mixed number

- Ask 'How many whole things?'
- Remember the fraction line means divide

The answer to the division is the whole things, the remainder is still a fraction with the same denominator (bottom number)

Exercise 24
Rewrite these improper fractions as mixed numbers:

	A	B	C
1	$\frac{5}{4}$	$\frac{5}{2}$	$\frac{11}{4}$
2	$\frac{11}{8}$	$\frac{9}{8}$	$\frac{17}{16}$

Do Nursing Calculations P39 Exercise 1O Part i

Exercise 25: Turn into mixed numbers:

	A	B	C
1	$\frac{83}{9}$	$\frac{45}{7}$	$\frac{48}{5}$
2	$\frac{33}{5}$	$\frac{39}{8}$	$\frac{70}{9}$
3	$\frac{76}{9}$	$\frac{61}{8}$	$\frac{31}{6}$
4	$\frac{43}{8}$	$\frac{29}{6}$	$\frac{28}{3}$

Converting Mixed numbers into Improper Fractions:

Example: Write $5\frac{1}{8}$ as an improper fraction

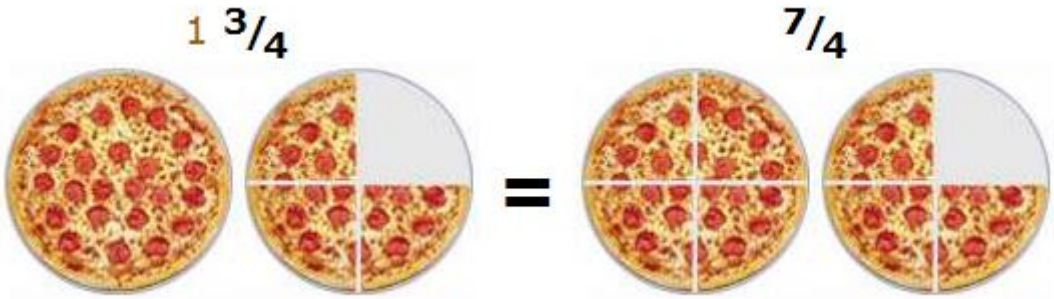
Note that the denominator does not change: $5\frac{1}{8}$ will become $\frac{?}{8}$

The question is: How many eighths in 5 whole thing. Each whole thing contains $^{8}/_{8}$ so 5 whole things contains $5 \times 8 = 40$ eighths. Then we need to add the 1 eighths that we already had.

So $5\frac{1}{8} = 5 + \frac{1}{8} = \frac{40}{8} + \frac{1}{8} = \frac{41}{8}$

Key Concept 7: Turning a mixed number into an improper fraction

- Look at the denominator, ask 'How many __ths'
- Multiply the whole things by the denominator
- Add on the remainder



Some Images in this fractions section are from http://www.mathsisfun.com/fractions
This website has further exercises and activities to practice fractions

Ex 26. Convert these mixed fractions into the equivalent improper fractions.

	A	B	C
1	$1\frac{3}{4}$	$2\frac{1}{8}$	$2\frac{1}{4}$
2	$2\frac{3}{8}$	$2\frac{1}{2}$	$2\frac{7}{8}$

Do Nursing Calculations P39 Exercise 1O Part ii

Exercise 27: Turn into improper fractions:

	A	B	C
1	$4\frac{1}{3}$	$5\frac{2}{5}$	$8\frac{1}{8}$
2	$9\frac{1}{5}$	$8\frac{1}{2}$	$4\frac{3}{8}$
3	$9\frac{1}{2}$	$4\frac{1}{9}$	$8\frac{1}{3}$
4	$3\frac{1}{4}$	$7\frac{1}{2}$	$1\frac{8}{9}$
5	$7\frac{1}{3}$	$3\frac{1}{8}$	$5\frac{3}{8}$
6	$3\frac{6}{7}$	$6\frac{3}{4}$	$9\frac{1}{4}$
7	$3\frac{3}{7}$	$2\frac{7}{8}$	$7\frac{1}{9}$

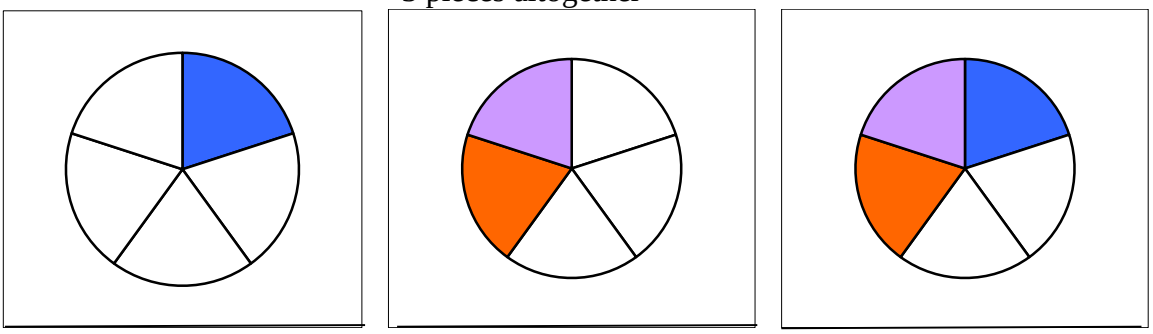
ADDITION and SUBTRACTION OF FRACTIONS

Part 1: Adding Fractions with the Same Denominator

Example: Work out $\frac{1}{5} + \frac{2}{5}$

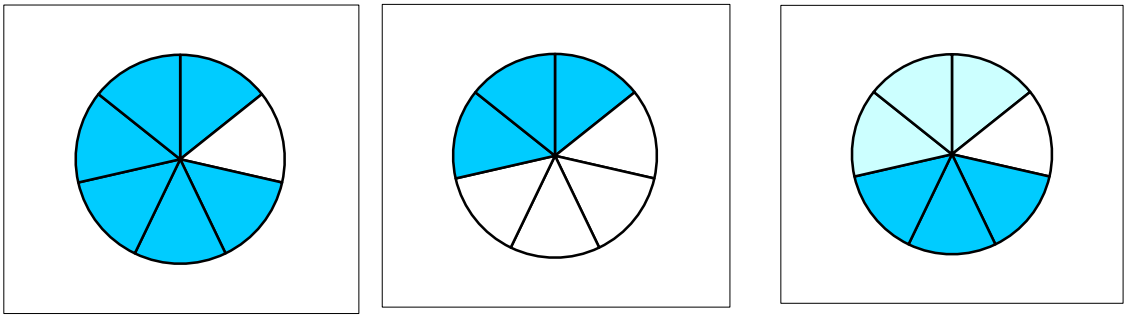
Answer: Think of a pie divided into 5 equal pieces. Each piece is $\frac{1}{5}$ of a whole pie.

$\frac{1}{5} + \frac{2}{5}$ means 1 piece plus 2 pieces
= 3 pieces altogether



So $\frac{1}{5} + \frac{2}{5} = \frac{3}{5}$

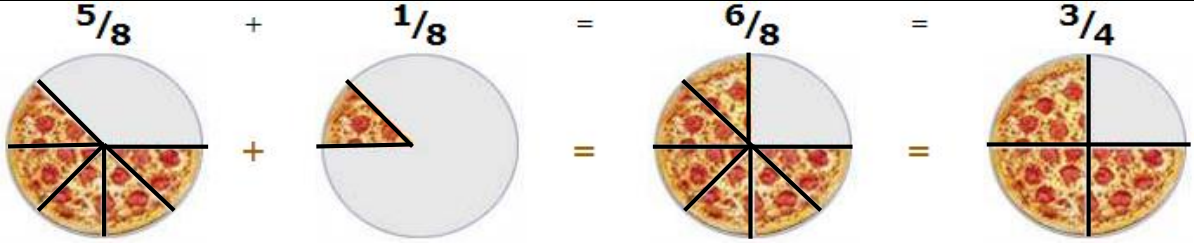
Example: Work out $\frac{6}{7} - \frac{3}{7}$



Answer: $\frac{6}{7} - \frac{3}{7} = \frac{6-3}{7} = \frac{3}{7}$

Key Concept 8: Adding Fractions with the same denominator (bottom number)

Add the top numbers. The bottom stays the same.



Exercise 28: Add the following fractions:

	A	B	C
1	$\frac{1}{8} + \frac{2}{8}$	$\frac{1}{7} + \frac{4}{7}$	$\frac{2}{7} + \frac{3}{7}$
2	$\frac{2}{11} + \frac{7}{11}$	$\frac{1}{5} + \frac{3}{5}$	$\frac{2}{9} + \frac{5}{9}$
3	$\frac{3}{7} + \frac{1}{7}$	$\frac{3}{10} + \frac{4}{10}$	$\frac{1}{3} + \frac{1}{3}$

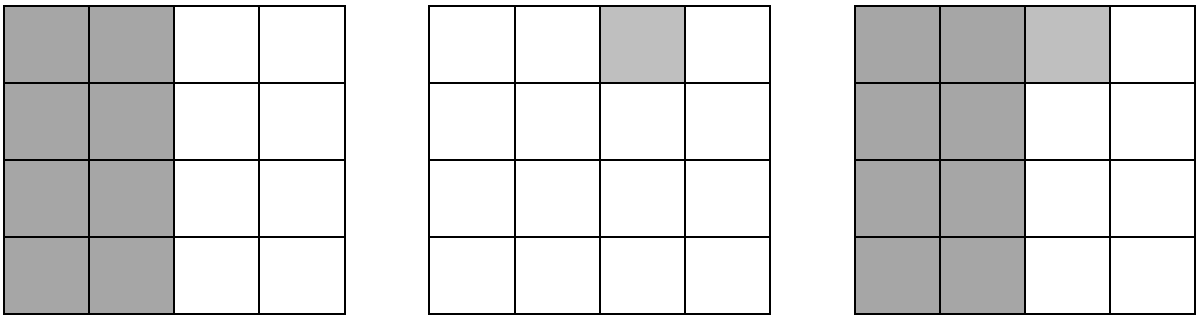
Exercise 29: Subtract the following fractions:

	A	B	C
1	$\frac{5}{7} - \frac{2}{7}$	$\frac{9}{11} - \frac{6}{11}$	$\frac{4}{9} - \frac{2}{9}$
2	$\frac{5}{9} - \frac{4}{9}$	$\frac{7}{11} - \frac{3}{11}$	$\frac{3}{5} - \frac{1}{5}$
3	$\frac{4}{5} - \frac{1}{5}$	$\frac{6}{7} - \frac{4}{7}$	$\frac{2}{3} - \frac{1}{3}$

See this website for some interesting interactive activities http://www.mathsisfun.com/fractions-interactive.html

Part 2 Adding Fractions with Different Denominators

When the denominators (bottom numbers) are different we cannot add or subtract them. They are talking about different things. We have to change them to equivalent fractions that do talk about the same thing (ie have the same denominator) and then we can add or subtract as before.



$\frac{1}{2}$ + $\frac{1}{16}$ =

$\frac{8}{16}$ + $\frac{1}{16}$ = $\frac{9}{16}$

Key Concept 9: Adding fractions with different denominators

You need to change the fractions to equivalent fractions with the same denominators.

(Use a picture to help!)

Exercise 30: Use fraction kits or a fraction wall to help work out:

(Use equivalent fractions to make both fractions have the same denominator)

	A	B	C
1	$\frac{1}{4} + \frac{1}{2}$	$\frac{1}{8} + \frac{1}{4}$	$\frac{1}{4} + \frac{1}{16}$
2	$\frac{1}{2} + \frac{3}{4}$	$\frac{1}{2} + \frac{3}{8}$	$\frac{3}{4} + \frac{1}{8}$
3	$\frac{3}{4} + \frac{1}{16}$	$\frac{7}{8} + \frac{1}{4}$	$\frac{5}{8} + \frac{3}{4}$
4	$\frac{5}{8} - \frac{1}{4}$	$\frac{7}{8} - \frac{1}{2}$	$1 - \frac{1}{8}$
5	$\frac{3}{4} - \frac{1}{2}$	$\frac{3}{4} - \frac{1}{8}$	$1 - \frac{3}{16}$

Part 3 Addition and Subtraction of Fractions with Different Denominators

Method: Find a common denominator and turn the fractions into equivalents with that denominator.

An equivalent fraction is made when you multiply both top and bottom by the same number, eg $\frac{2}{3}, \frac{4}{6}, \frac{6}{9}, \frac{12}{18}, \frac{50}{75}$ are all equivalent fractions.

Where the denominators are different but one is a multiple of the other that will be the common denominator.

Example: $\frac{1}{5} + \frac{7}{10}$ 10 is a multiple of 5, so 10 will be the common denominator

$\frac{1}{5} \times \frac{2}{2} = \frac{2}{10}$ Change the other fraction so that it is in tenths as well

$\frac{2}{10} + \frac{7}{10} = \frac{9}{10}$ Add the numerators together

Exercise 31: Add these:

	A	B	C
1	$\frac{3}{5} + \frac{3}{10}$	$\frac{2}{5} + \frac{3}{10}$	$\frac{3}{7} + \frac{3}{14}$
2	$\frac{3}{4} + \frac{1}{16}$	$\frac{1}{4} + \frac{11}{16}$	$\frac{1}{3} + \frac{2}{15}$
3	$\frac{1}{4} + \frac{3}{8}$	$\frac{3}{7} + \frac{10}{21}$	$\frac{2}{7} + \frac{3}{14}$
4	$\frac{5}{7} + \frac{3}{14}$	$\frac{2}{3} + \frac{4}{15}$	$\frac{1}{3} + \frac{5}{15}$

SUBTRACTION

Example: $\frac{13}{15} - \frac{2}{5} = \frac{13}{15} - \frac{2 \times 3}{5 \times 3}$ Use 15 as the denominator for both fractions so change the second fraction only

$= \frac{13}{15} - \frac{6}{15} = \frac{7}{15}$

SEE EXAMPLE ON THE PREVIOUS PAGE

Exercise 32: Subtract these:

	A	B	C
1	$\frac{3}{8} - \frac{1}{4}$	$\frac{11}{16} - \frac{1}{4}$	$\frac{3}{5} - \frac{3}{10}$
2	$\frac{3}{7} - \frac{3}{14}$	$\frac{2}{5} - \frac{3}{10}$	$\frac{3}{4} - \frac{1}{16}$
3	$\frac{2}{3} - \frac{2}{15}$	$\frac{1}{3} - \frac{4}{15}$	$\frac{11}{12} - \frac{3}{4}$
4	$\frac{10}{21} - \frac{3}{7}$	$\frac{5}{7} - \frac{5}{14}$	$\frac{15}{27} - \frac{2}{9}$

ADDITION and SUBTRACTION OF FRACTIONS Part 4 **(Extension Work)**

Fractions with Different Denominators

Example: $\frac{3}{8} + \frac{5}{12}$ Find a number that both 8 and 12 go into. (If necessary, multiply 8 by 12 = 96. This will work but in this case they both go into 24 so that is easier and saves simplifying at the end.

Change both fractions to equivalent fractions with denominator of 24.

$\frac{3}{8} \times 3 = \frac{9}{24}$ $\frac{5}{12} \times 2 = \frac{10}{24}$

$\frac{9}{24} + \frac{10}{24} = \frac{19}{24}$ Add the new numerators

"If adding or subtracting is your aim,
The bottom numbers must be the same!

"And don't forget to simplify,
Before it's time to say goodbye"

Exercise 33. Calculate:

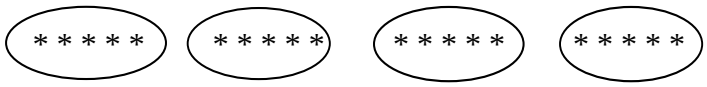
	A	B	C
1	$\frac{1}{3} + \frac{3}{8}$	$\frac{3}{5} + \frac{1}{3}$	$\frac{2}{3} + \frac{1}{5}$
2	$\frac{2}{7} + \frac{2}{3}$	$\frac{2}{3} + \frac{1}{7}$	$\frac{1}{12} + \frac{7}{8}$
3	$\frac{1}{7} + \frac{1}{2}$	$\frac{3}{7} + \frac{1}{5}$	$\frac{4}{7} + \frac{3}{8}$
4	$\frac{5}{12} + \frac{1}{8}$	$\frac{2}{9} + \frac{4}{5}$	$\frac{3}{4} + \frac{1}{5}$
5	$\frac{2}{5} + \frac{1}{3}$	$\frac{2}{5} + \frac{3}{7}$	$\frac{5}{9} + \frac{3}{5}$

Exercise 34. Use equivalent fractions to calculate these subtractions:

	A	B	C
1	$\frac{2}{3} - \frac{3}{8}$	$\frac{3}{5} - \frac{1}{3}$	$\frac{4}{5} - \frac{2}{3}$
2	$\frac{1}{3} - \frac{2}{7}$	$\frac{3}{7} - \frac{1}{5}$	$\frac{7}{8} - \frac{1}{12}$
3	$\frac{1}{2} - \frac{1}{7}$	$\frac{1}{3} - \frac{1}{5}$	$\frac{5}{7} - \frac{3}{8}$
4	$\frac{2}{3} - \frac{1}{7}$	$\frac{5}{12} - \frac{1}{8}$	$\frac{11}{15} - \frac{5}{7}$
5	$\frac{2}{3} - \frac{1}{4}$	$\frac{3}{4} - \frac{2}{15}$	$\frac{8}{9} - \frac{5}{6}$

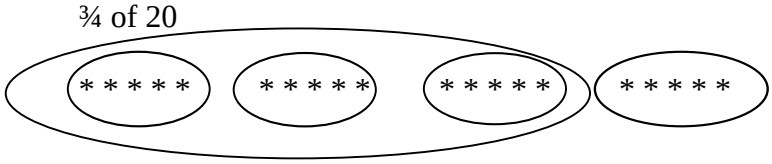
Fractions: **FRACTIONS OF A NUMBER**

Example: ¼ of 20



If we split 20 into quarters, we split it into 4 groups. Each group contains 5. So ¼ of 20 = 5.

Example: ¾ of 20



Each quarter contains 5. So three quarters contains 3 lots of 5 = 15.

To solve this remember the fraction line means divide, so divide by the number on the bottom of the fraction. Multiply by the number on the top.

¾ of 20 = 20 ÷ 4 × 3 = 15

Key Concept 10: Finding a fraction of a number

Divide by the bottom (ie the denominator of the fraction)

then

Multiply by the top (ie the numerator of the fraction)

(or write as a fraction multiplication, 'OF' indicates multiplication)

Another way is to first multiply by the top
then
divide by the bottom

Exercise 35: Solve these:

	A	B	C
1	$\frac{1}{3}$ of 18	$\frac{1}{6}$ of 42	$\frac{1}{7}$ of 56
2	$\frac{1}{8}$ of 64	$\frac{1}{4}$ of 28	$\frac{1}{10}$ of 60
3	$\frac{1}{6}$ of 864	$\frac{1}{3}$ of 555	$\frac{1}{7}$ of 217
4	$\frac{1}{7}$ of 434	$\frac{1}{12}$ of 60	$\frac{1}{5}$ of 545
5	$\frac{2}{5}$ of 35	$\frac{4}{7}$ of 21	$\frac{5}{6}$ of 24
6	$\frac{3}{8}$ of 32	$\frac{3}{10}$ of 60	$\frac{9}{10}$ of 20
7	$\frac{3}{10}$ of 300	$\frac{7}{10}$ of 400	$\frac{9}{10}$ of 600
8	$\frac{3}{4}$ of 140	$\frac{2}{3}$ of 276	$\frac{3}{5}$ of 935
9	$\frac{5}{8}$ of 224	$\frac{4}{9}$ of 306	$\frac{6}{7}$ of 455

♫ "Multiplying fractions no big problem,
Top times top over bottom times bottom,

Fractions: **MULTIPLICATION of FRACTIONS**

Example A

$\frac{1}{2} \times \frac{2}{3} = \frac{1 \times 2}{2 \times 3} = \frac{2}{6} = \frac{1}{3}$

Multiply the top row
Multiply the bottom row

(This can be understood as ½ of $^2/_3$ which is $^1/_3$

Example B

$\frac{2}{5} \times \frac{4}{7}$

$\frac{2}{5} \times \frac{4}{7} = \frac{2 \times 4}{5 \times 7}$ Multiply the top row
Multiply the bottom row

$= \frac{8}{35}$ [This fraction can not be simplified]

Example B Sometimes the fractions can be simplified/cancelled before you multiply. You can do this within one fraction or diagonally across fractions (the numerator of one fraction and the denominator of the other). This gives easier numbers to multiply which leads to fewer mistakes and saves simplifying at the end.

$\frac{5}{8} \times \frac{7}{10}$

1

$\frac{\cancel{5}}{8} \times \frac{7}{\cancel{10}_{2}} = \frac{1 \times 7}{8 \times 2}$ [Dividing the diagonals by 5]

$= \frac{7}{16}$

(Note that $\frac{5}{8} \times \frac{7}{10}$ is the same as $\frac{5}{10} \times \frac{7}{8}$ (as when we multiply top and bottom we get the same)

But $^5/_{10} = ½$)

Example C

$\frac{9}{10} \times \frac{8}{15}$

3 4

$\frac{\cancel{9}}{\cancel{10}_{5}} \times \frac{\cancel{8}}{\cancel{15}_{5}} = \frac{3 \times 4}{5 \times 5}$ [Dividing one of the diagonals by 3 and the other by 2]

$= \frac{12}{25}$

Do Nursing Calculations P41 Exercise 1P

FRACTIONS

Key Concept 11: Multiplying fractions

Simplify diagonally as much as you can

Multiply across top and bottom

Exercise 36: Multiply:

	A	B	C
1.	$\frac{1}{6} \times \frac{9}{10}$	$\frac{5}{6} \times \frac{8}{15}$	$\frac{1}{7} \times \frac{7}{18}$
2.	$\frac{3}{7} \times \frac{1}{20}$	$\frac{4}{7} \times \frac{5}{3}$	$\frac{5}{7} \times \frac{12}{25}$
3.	$\frac{1}{8} \times \frac{1}{2}$	$\frac{3}{8} \times \frac{12}{5}$	$\frac{5}{8} \times \frac{9}{20}$
4.	$\frac{7}{9} \times \frac{9}{16}$	$\frac{8}{9} \times \frac{1}{6}$	$\frac{1}{10} \times \frac{15}{8}$
5.	$\frac{7}{10} \times \frac{2}{7}$	$\frac{9}{10} \times \frac{15}{16}$	$\frac{1}{11} \times \frac{11}{18}$
6.	$\frac{5}{12} \times \frac{7}{30}$	$\frac{7}{12} \times \frac{9}{40}$	$\frac{11}{12} \times \frac{33}{40}$
7.	$\frac{12}{225} \times \frac{125}{132}$	$\frac{18}{25} \times \frac{75}{76}$	$\frac{81}{100} \times \frac{25}{27}$

Multiplication of Whole Numbers and Fractions

Working out a fraction of a whole number, can also be solved using the fraction multiplication method.

Example: $\frac{2}{5}$ x 8 The multiplication sign here would match **of** in a word problem, e.g.:

$\frac{2}{5}$ **of** 8 packets of biscuits were water damaged – how many packets is this?

Answer: $\frac{2}{5}$ x 8 = $\frac{2}{5}$ x $\frac{8}{1}$ Turn the whole number into a top heavy fraction

Multiply the top row, multiply the bottom row

= $\frac{16}{5}$ = $5\frac{1}{5}$ Always turn improper fractions into mixed numbers to make Sense of your answer.

Exercise 37. Solve these, giving answers as mixed numbers where necessary:

	A	B	C
1	$\frac{1}{3}$ x 6	$\frac{3}{4}$ x 10	$\frac{5}{9}$ x 6
2	$\frac{7}{8}$ x 12	6 x $\frac{3}{7}$	$\frac{4}{5}$ x 15
3	3 x $\frac{10}{11}$	$\frac{14}{5}$ x 8	$\frac{3}{8}$ x \$240
4	$\frac{11}{2}$ x 8	$\frac{3}{10}$ x 10	$\frac{9}{12}$ x \$560

FRACTIONS **(Extension Work)**

Division by Fractions

Drug dosage and dilution calculations can involve division by a fraction.

Method: To divide a fraction, invert the divisor (the second fraction) and then multiply.
(NOTE: The Divisor is the number you are dividing by)

or To divide by a fraction, multiply by its reciprocal.
(NOTE: The reciprocal of $\frac{a}{b}$ is $\frac{b}{a}$)

or **Multiply by the flip**

Example A $\frac{1}{3} \div \frac{4}{5}$

$\frac{1}{3} \div \frac{4}{5}$

$\frac{1}{3} \times \frac{5}{4}$

$= \frac{5}{12}$

Example B $\frac{9}{10} \div \frac{6}{7}$

$\frac{9}{10} \div \frac{6}{7} = \frac{\cancel{9}^{3}}{10} \times \frac{7}{\cancel{6}_{2}}$ ('Cancelling' diagonally by 3)

$= \frac{21}{20}$ or $1\frac{1}{20}$

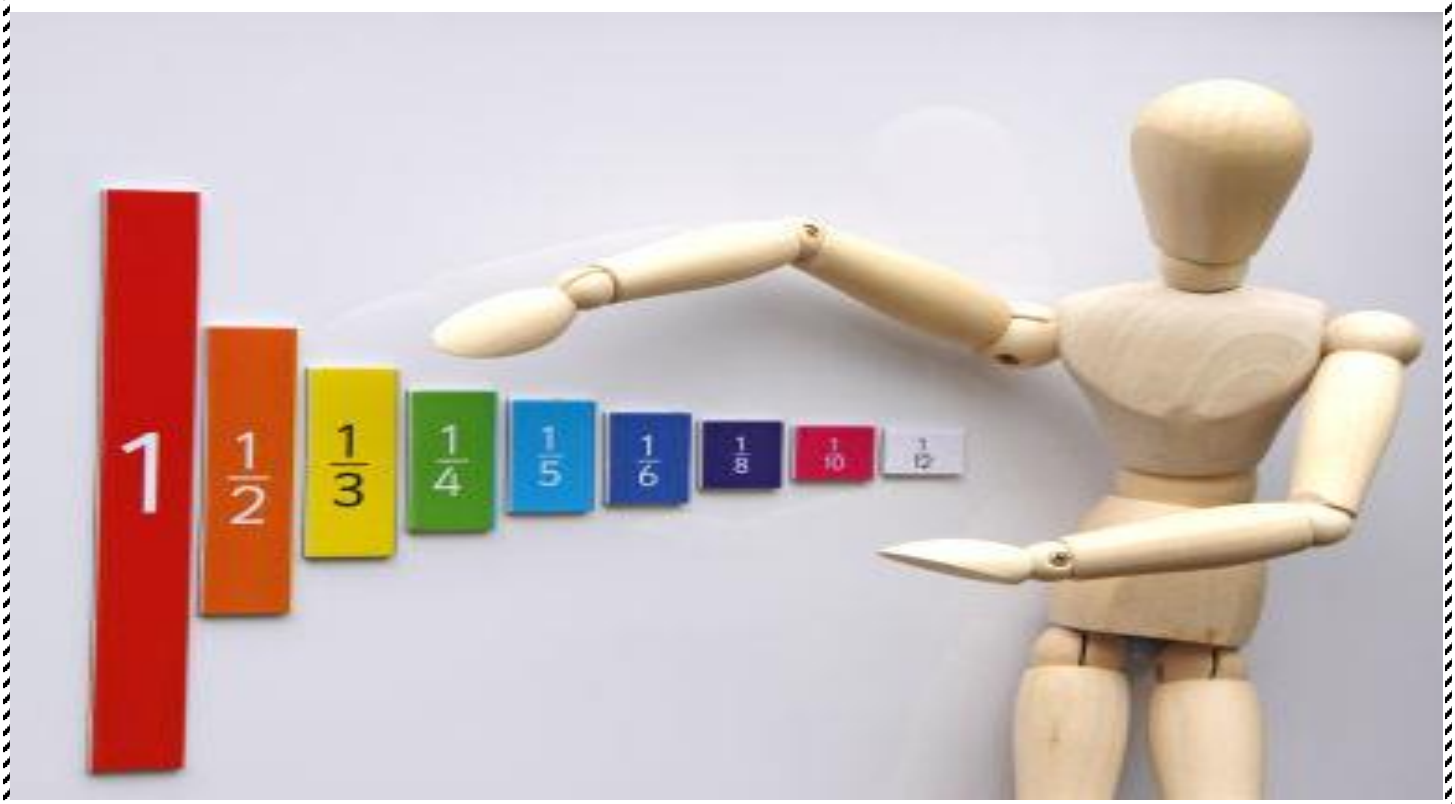
Exercise 38. Simplify where possible:

	A	B	C
1	$\frac{1}{2} \div \frac{3}{4}$	$\frac{1}{2} \div \frac{1}{3}$	$\frac{1}{3} \div \frac{1}{4}$
2	$\frac{2}{3} \div \frac{1}{6}$	$\frac{2}{3} \div \frac{4}{9}$	$\frac{1}{4} \div \frac{1}{2}$
3	$\frac{3}{4} \div \frac{5}{6}$	$\frac{3}{4} \div \frac{1}{5}$	$\frac{1}{5} \div \frac{1}{3}$
4	$\frac{3}{5} \div \frac{9}{10}$	$\frac{4}{5} \div \frac{2}{3}$	$\frac{1}{6} \div \frac{7}{9}$
5	$\frac{1}{3} \div \frac{5}{9}$	$\frac{1}{4} \div \frac{4}{5}$	$\frac{2}{5} \div \frac{3}{5}$

FRACTIONS **(Extension work)**

Exercise 39: More division:
Remember, turn any whole number into an improper fraction with a denominator of 1 and turn any mixed number into an improper fraction, before you do the division

	A	B	C
1	$\frac{1}{7} \div \frac{1}{8}$	$\frac{2}{7} \div \frac{4}{5}$	$\frac{3}{7} \div \frac{9}{10}$
2	$\frac{5}{7} \div \frac{10}{3}$	$\frac{6}{7} \div \frac{3}{4}$	$\frac{1}{8} \div \frac{7}{8}$
3	$5 \div \frac{5}{6}$	$\frac{7}{8} \div \frac{1}{2}$	$\frac{1}{9} \div \frac{1}{5}$
4	$\frac{5}{8} \div \frac{5}{6}$	$7 \div \frac{1}{2}$	$\frac{1}{9} \div 5$
5	$\frac{4}{9} \div \frac{1}{6}$	$\frac{5}{9} \div \frac{5}{8}$	$\frac{7}{9} \div \frac{7}{10}$
6	$\frac{1}{10} \div \frac{1}{7}$	$\frac{3}{10} \div \frac{5}{6}$	$\frac{7}{10} \div \frac{7}{8}$
7	$1\frac{1}{2} \div \frac{1}{3}$	$5 \div 2\frac{1}{2}$	$3\frac{1}{2} \div 2$
8	$\frac{4}{7} \div \frac{1}{3}$	$\frac{3}{8} \div \frac{9}{10}$	$\frac{2}{7} \div 3$
9	$\frac{2}{9} \div \frac{2}{3}$	$\frac{8}{9} \div \frac{2}{3}$	$\frac{9}{10} \div \frac{3}{5}$



Fractions : **CHANGING DECIMALS TO FRACTIONS**

Example A – Change 0.4 to a fraction and simplify

0.4 = The 4 is in the $\frac{1}{10}$'s column so it = $\frac{4}{10}$

Or note that the number uses one decimal place so there is one zero in the denominator

Simplify your answer: $\frac{4}{10}$ divided top and bottom by 2 = $\frac{2}{5}$

Example B – Change 0.36 to a fraction and simplify

0.36 = Look at the last digit, the 6: because it is in the $\frac{1}{100}$'s column, the fraction will be $\frac{36}{100}$

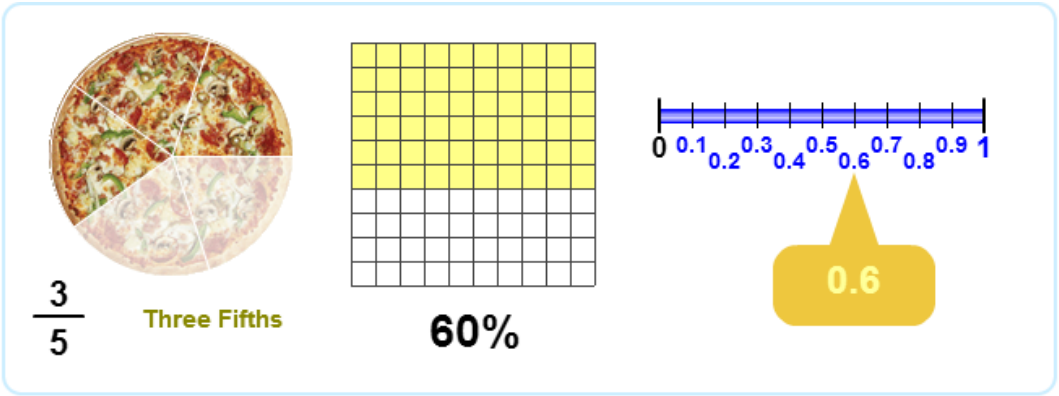
Or note that the number goes to two decimal places (two columns after the point) so there will be two zeros in the denominator

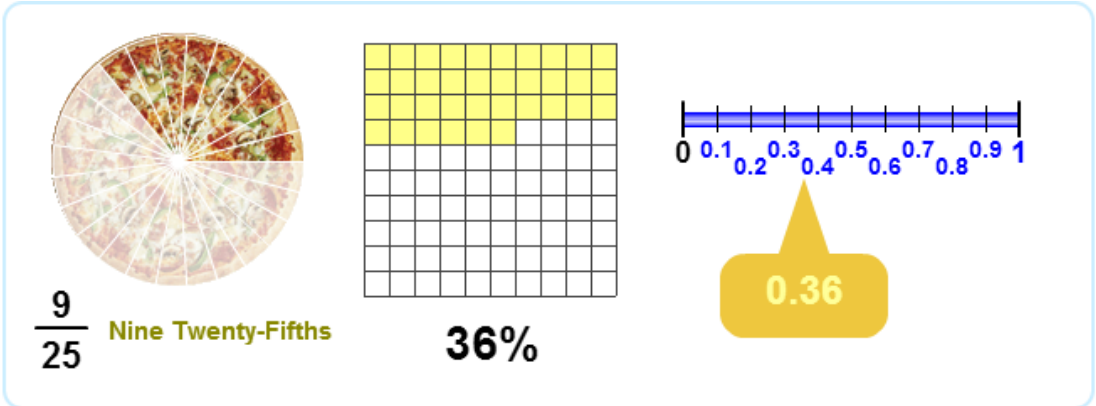
Simplify your answer: $\frac{36}{100}$ divided by 4 top and bottom = $\frac{9}{25}$

Key Concept 12: Conversions : Decimal to Fraction

Look at the place value of the last digit – this is the bottom of the fraction

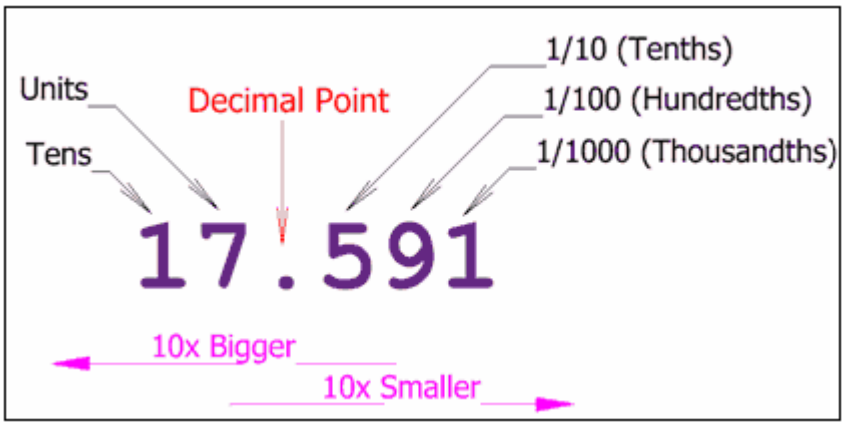
Remember the number of decimal places = the number of zeros





Tens	Units	.	Tenths	Hundredths	Thousandths
10	1		$^1/_{10}$	$^1/_{100}$	$^1/_{1000}$

Remember decimal place values



Exercise 40: Change to a fraction and simplify where possible:

	A	B	C
1	0.1	0.2	0.3
2	0.24	0.46	0.77
3	0.35	0.81	0.66
4	0.6	0.7	0.8
5	0.95	0.55	0.03
6	0.65	0.25	0.36
7	0.125	0.875	0.375
8	0.16	0.83	0.45
9	0.5	0.9	0.8
10	0.75	0.26	0.39
11	0.18	0.69	0.48
12	0.005	0.006	0.004
13	0.85	0.92	0.57
14	0.02	0.08	0.04
15	0.79	0.38	0.99
16	0.012	0.025	0.075

FRACTIONS

Changing Fractions to Decimals

Method 1: Find an equivalent fraction with 10, 100 or 1000 on the denominator (bottom)

Example A: Change $^4/_{25}$ to a decimal
Multiply top and bottom by 4: $\frac{4}{25} \times \frac{4}{4} = \frac{16}{100}$

100 has 2 zeros, so we need to write 16 ending in the 2nd decimal place (hundredths) ie 0.16

Example B: Change $^3/_8$ to a decimal
Multiply top and bottom by 125: $\frac{3}{8} \times \frac{125}{125} = \frac{375}{1000}$

100 has 3 zeros, so we need to write 375 ending in the 3rd decimal place (thousandths) ie 0.375

Example C: Change $^1/_{20}$ to a decimal
Multiply top and bottom by 5: $\frac{1}{20} \times \frac{5}{5} = \frac{5}{100}$

100 has 2 zeros, so we need to write 5 ending in the 2nd decimal place (hundredths) ie 0.05

It is useful to remember:

$4 \times 25 = 100$
$5 \times 20 = 100$
$8 \times 125 = 1000$
$40 \times 25 = 1000$

Key Concept 13: Conversions : Fraction to Decimal
Find an equivalent fraction with 10, 100 or 1000 on the bottom
OR Divide

Do Nursing Calculations P33 Exercise 1L using this method

FRACTIONS

Exercise 41: Write these fractions as a decimal:
(this exercise is the same as Ex 1L of the Nursing calculations textbook)

	A	B	C
1.	$\frac{7}{10}$	$\frac{3}{10}$	$\frac{9}{10}$
2.	$\frac{17}{100}$	$\frac{37}{100}$	$\frac{15}{100}$
3.	$\frac{7}{100}$	$\frac{1}{100}$	$\frac{3}{100}$
4.	$\frac{4}{5}$	$\frac{3}{5}$	$\frac{2}{5}$
5.	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{20}$
6.	$\frac{1}{8}$	$\frac{3}{20}$	$\frac{7}{8}$
7.	$\frac{13}{20}$	$\frac{1}{25}$	$\frac{7}{25}$
8.	$\frac{1}{40}$	$\frac{9}{40}$	$\frac{11}{40}$
9.	$\frac{1}{50}$	$\frac{3}{50}$	$\frac{19}{50}$

Fractions: **CHANGING FRACTIONS TO DECIMALS**

Method 2: Divide the numerator (top) by the denominator (bottom).

Example A – Change $^3/_8$ to a decimal

Write $8\overline{)\,3}$ as $8\overline{)\,3.000}$ with as many noughts after the decimal point as you think you might need and place the decimal point of the answer above the decimal point in the number being divided. If the fraction is not top heavy, your answer will always be start with **0.**

```
  0.375
8 ) 3.000
  – 24
    60
  – 56
    40
  – 40
    …
```

Example B – Change $^3/_{20}$ to a decimal

$20\overline{)\,3}$ becomes $20\overline{)\,3.0000000}$

which becomes $20\overline{)\,3.000000}$ (**0.** above)

```
  0.1 5
20 ) 3.0 0 0 0 000
   – 2 0
     1 0
   – 1 0 0
     …
```

Example C – Change $^4/_{25}$ to a decimal

```
  0.1 6
25 ) 4.0 0
 –2 5
  1 5 0
 –1 5 0
    …
```

Example D – Change $^4/_7$ to a decimal correct to 2 decimal places

```
  0.5 7 1
7 ) 4.0 0 0
  – 3 5
    5 0
  – 4 9
      1 0
```

Calculate to 3 decimal places then round to 2 decimal places (see **Dividing and Rounding** in the Decimal Arithmetic Section)

Do Nursing Calculations P35 and 37, Exercise 1M and 1N using this method

Some useful decimal fractions to remember:	**Fraction**	**Decimal**
	1	**1**
	$\frac{1}{2}$	**0.5**
	$\frac{1}{4}$	**0.25**
	$\frac{3}{4}$	**0.75**
	$\frac{1}{10}$	**0.1**
	$\frac{1}{5}$	**0.2**
	$\frac{1}{3}$	**0.33**
	$\frac{2}{3}$	**0.67**
	$\frac{1}{8}$	**0.125**

FRACTIONS

Exercise 42: Write these fractions as a decimal (Give your answer to 2 decimal places):
(this exercise is also in the "Nursing Calculations" textbook by Gatford and Phillips Ex 1M and 1N)

	A	B	C
1.	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{1}{6}$
2.	$\frac{5}{6}$	$\frac{4}{9}$	$\frac{7}{9}$
3.	$\frac{1}{7}$	$\frac{3}{7}$	$\frac{6}{7}$
4.	$\frac{1}{11}$	$\frac{3}{13}$	$\frac{2}{15}$

FRACTIONS

Exercise 43: Word problems

a) 5 people in the Maths for Nursing class got merits, 8 passed and 4 scored incomplete. Express each of these quantities as a fraction of the class.
(Hint: First work out the total number of students in the class.)

b) Triggers for migraines among a group of 150 sufferers were reported as follows:

33 chocolate	7 chemical sprays
82 stress	25 icecream
18 PMS	5 weather

(Note that some people have more than one trigger so these numbers total more than 150)
Express each of these as a fraction (out of 150 suffers), simplified where possible.

c) $\frac{2}{5}$ of Jan's clients presented with chronic conditions. The remainder presented with a variety of acute conditions. What fraction is this? If there were 45 clients in total, how many people's conditions were labelled as chronic and how many were labelled acute?

d) Last year, UNITEC's medical centre saw 2,530 students. $\frac{3}{5}$ of these students had community services cards. How many did not? (Express this as a fraction and as the number of students.)

e) A cat is to receive 90 kilocalories (kcal) of canned food at each meal. If the food has a caloric density of 360 kcal per can, what fraction of the can does it need?

Extension Questions:

f) Kim competed in a triathlon. She ran for 1/8 of the total distance and cycled for ½ of the total distance. What fraction did she kayak?

g) You have 30 metres of curtaining available and have worked out that each window will need 1½ metres. How many windows can be curtained?

h) 8 cream sponge cakes have been provided for graduation, and these have been divided into $\frac{1}{12}$'s. How many pieces are there? If we expect 150 people and would like each person to have at least one piece each, how many more sponge cakes do we need?

i) Tablet A has a strength of 0.125mg and tablet B has a strength of $\frac{1}{7}$ mg. Which tablet is stronger?

j) A dog ate $\frac{2}{3}$ cup dry food in the morning, $\frac{1}{4}$ cup in the afternoon and $\frac{1}{2}$ cup in the evening. If the food has caloric density of 360kcal per cup, how many kcal did the dog eat in total?

PERCENTAGES

Introduction to Percentages

Percentage means PARTS IN A HUNDRED or

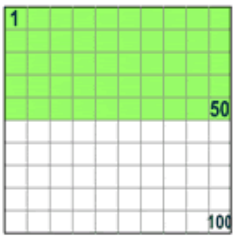
PARTS PER HUNDRED or

PARTS OUT OF A HUNDRED

100% is 1 whole

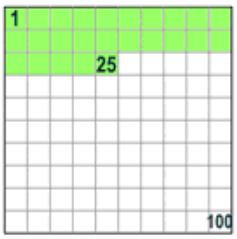
One percent (**1%**) means 1 per 100.

1% of this line is shaded green: it is very small isn't it?



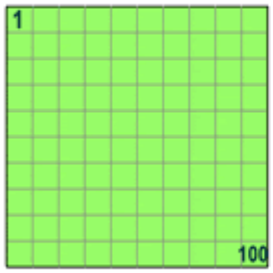
50% means 50 per 100
(50% of this box is green)

25% means 25 per 100
(25% of this box is green)



From http://www.mathsisfun.com/percentage.html

100% means all.



Example:

$$100\% \text{ of } \mathbf{80} \text{ is } \frac{100}{100} \times 80 = 80$$

So **100% pure fruit juice** means drink contains only fruit juice.

1% cetrimide solution means 1 part in 100 is pure cetrimide, diluted with 99 parts of water.

75% wool blend means 75 in every 100 strands or grams of fibre are wool (the other 25 are something else).

19% of New Zealanders are vegetarian means 19 in every 100 New Zealanders are vegetarian. So how many eat meat?

25% OFF means you only have to pay 75 cents for every dollar that the sale item originally cost.

PERCENTAGES CHANGING PERCENTAGES TO DECIMALS

Divide the percentage by 100 ...and remove the % sign

Remember to divide by 100 we move the decimal point two places to the left.

From Percent	To Decimal	
75% 0.75 (2 Places)	0.75	move the decimal point **2 places to the left**, and remove the "%" sign.

From http://www.mathsisfun.com/decimal-fraction-percentage.html

Example A

Express 35% as a decimal

$35\% = \frac{35}{100} = 35 \div 100 = 0.35$

Example B

Express 6% as a decimal

$6\% = \frac{6}{100} = 6 \div 100 = 0.06$

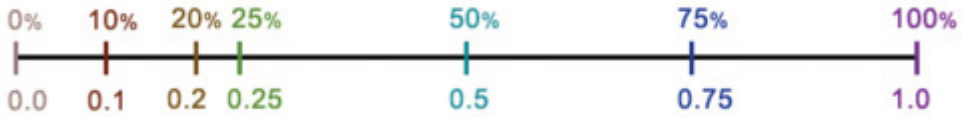
Key Concept 14: Conversions : Percent to Decimal

Divide by 100 (move decimal point two places to the left)

Exercise 44: Express as a Decimal

	A	B	C
1	14%	52%	99%
2	84%	32%	45%
3	350%	393%	501%
4	4%	2%	6%
5	64%	19.5%	10.03%
6	13.6%	16.45%	1.8%
7	0.5%	2.5%	1.06%

PERCENTAGES **CHANGING DECIMALS TO PERCENTAGES**



Remember that percent means per hundred or out of 100, so it means that you can easily convert any fraction out of 100 into a percentage. For example 0.25 = $\frac{25}{100}$ = 25%

A short cut method to change a decimal to a percentage is to simply multiply the decimal by 100… and then place a percentage sign at the end. See the examples below.

Example A

0.25 × 100 = 25**%**

Example B

Change 1.625 to a percentage

1.625 100 = 162.5**%**

Remember to multiply by 100 we move the decimal point 2 places to the right

From http://www.mathsisfun.com/decimal-fraction-percentage.html

From Decimal	To Percent	
0.125	0.12.5 (2 Places) 12.5%	move the decimal point **2 places to the right**, and add the "%" sign.

Key Concept 15 : Conversions : Decimal to Percent

Multiply by 100 (move decimal point two places to the right)

Exercise 45: Write as Percentages

	A	B	C
1	0.73	0.82	0.84
2	0.07	0.97	0.87
3	0.7	0.06	0.02
4	1.08	1.1	6.4
5	3.1	0.5	0.1

6	0.0029	0.004	0.693
7	0.875	0.025	3.19

CHANGING PERCENTAGES TO FRACTIONS

Make as a fraction over 100 and simplify if possible.
Remove the % sign by multiplying top and bottom number by 10, 100, 1000, or other multiple of 10..

Example A
Change 16% to a fraction

$$\mathbf{16\%} = \frac{16}{100}$$

then simplify:

$$\frac{16}{100} \div 4 = \mathbf{\frac{4}{25}}$$

Example B
Change 0.3% to a fraction

$$\mathbf{0.3\%} = \frac{0.3}{100}$$ (Multiply numerator and denominator by 10 so the numerator is a whole number)

$$= \mathbf{\frac{3}{1000}}$$ which cannot be simplified

Example C
Change 0.08% to a fraction

$$\mathbf{0.08\%} = \frac{0.08}{100}$$ (Multiply numerator and denominator by 100 so the numerator is a whole number)

$$= \frac{8}{10000} = \frac{4}{5000} = \mathbf{\frac{1}{1250}}$$

Useful fractions & percentages to remember	
Fraction	**Percentage**
1	100%
$\frac{1}{2}$	50%
$\frac{1}{4}$	25%
$\frac{3}{4}$	75%
$\frac{1}{10}$	10%
$\frac{1}{100}$	1%
$\frac{1}{5}$	20%
$\frac{1}{3}$	33.33%
$\frac{2}{3}$	66.67%
$\frac{1}{8}$	12.5%

Example D

Change $3\frac{1}{2}$ % to a fraction

3½ = 3.5

Put as a fraction and multiply by 10:

$$\frac{3.5}{100} \times \frac{10}{10} = \frac{35}{1000}$$

Simplify: $\frac{35}{1000} \div 5 = \frac{7}{200}$

Or 3½ = $^7/_2$

Note that to divide a fraction by 100 we can multiply by 1/100

$$\frac{7}{2} \times \frac{1}{100} = \frac{7}{200}$$

Therefore $3\frac{1}{2}$ % equals $\frac{7}{200}$

PERCENTAGES

Key Concept 16: Conversions : Percent to Fraction

Write as a fraction over 100. Simplify the fraction if possible.

Exercise 46: Change each percentage to a fraction and simplify (cancel down) if possible:

	A	B	C
1	15%	10%	35%
2	45%	12%	40%
3	4%	2%	3%
4	90%	20%	50%
5	5%	7%	30%
6	0.1%	0.7%	0.4%
7	0.2%	0.8%	0.9%
8	0.04%	0.05%	0.06%
9	0.5%	0.01%	0.07%
10	0.6%	0.02%	0.09%
11	$\frac{1}{2}\%$	$2\frac{1}{2}\%$	$7\frac{1}{2}\%$
12	$1\frac{1}{2}\%$	$4\frac{1}{2}\%$	$12\frac{1}{2}\%$

PERCENTAGES **CHANGING FRACTIONS TO PERCENTAGES**

remember that percentage means
PARTS IN A HUNDRED or PARTS PER HUNDRED

Method 1: Change the fraction to an equivalent fraction with 100 on the bottom. Then the numerator (the top of the fraction) gives us the percentage.

Example: Change $\frac{7}{20}$ to a percentage

Multiply top and bottom by 5:

$\frac{7}{20} \times \frac{5}{5} = \frac{35}{100} = 35\%$

Key Concept 17: Conversions : Fraction to Percent

Find an equivalent fraction with 100 on the bottom

OR

Multiply by 100

Exercise 47: Change to a Percentage:

	A	B	C
1	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{4}$
2	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$
3	$\frac{1}{10}$	$\frac{3}{10}$	$\frac{7}{10}$
4	$\frac{1}{20}$	$\frac{9}{20}$	$\frac{11}{20}$
5	$\frac{11}{25}$	$\frac{17}{25}$	$\frac{19}{25}$
6	$\frac{3}{20}$	$\frac{13}{20}$	$\frac{23}{25}$
7	$\frac{4}{5}$	$\frac{17}{20}$	$\frac{13}{25}$

PERCENTAGES

(Extension Work)

Changing Fractions to Percentages

Method 2: Multiply the fraction by 100 and add the % sign or
Method 3: Convert to a decimal, then multiply by 100 and add the % sign

---

Example A Change $\frac{7}{20}$ to a percentage

$\frac{7}{20} = \frac{7}{\cancel{20}_{1}} \times \frac{\cancel{100}^{5}}{1}$ (Cancel across by 20)

OR $\frac{7}{20} \times \frac{5}{5} = \frac{35}{100} = 35\%$

$= 35\%$

Example B Change $\frac{3}{8}$ to a percentage

$\frac{3}{8} = \frac{3}{\cancel{8}_{2}} \times \frac{\cancel{100}^{25}}{1}$ (Cancel across by 4)

OR $\frac{3}{8} \times \frac{125}{125} = \frac{375}{1000} = \frac{37.5}{100} = 37.5\%$

$= \frac{75}{2} = 37\frac{1}{2}\%$ or 37.5%

Example C Change $\frac{9}{1000}$ to a percentage

$\frac{9}{1000} = \frac{9}{\cancel{1000}_{10}} \times \frac{\cancel{100}^{1}}{1}$ (Cancel across by 100)

OR $\frac{9}{1000} = \frac{0.9}{100} = 0.9\%$

$= \frac{9}{10}\% = 0.9\%$

Exercise 48: Change to a percentage:

	A	B	C
1	$\frac{7}{8}$	$\frac{5}{8}$	$\frac{1}{8}$
2	$\frac{1}{40}$	$\frac{3}{40}$	$\frac{7}{40}$
3	$\frac{1}{1000}$	$\frac{3}{1000}$	$\frac{7}{1000}$
4	$\frac{3}{500}$	$\frac{1}{500}$	$\frac{7}{500}$
5	$\frac{1}{5000}$	$\frac{3}{5000}$	$\frac{11}{10000}$

look at the card matching game at http://nrich.maths.org/content/01/02/game1/MatchingCardsFrac.swf

Example: Order from smallest to largest:

0.3 $^1/_{50}$ $^1/_{1000}$ 0.5 9% $^5/_9$

Where necessary, convert to compare.
9% = 0.09 which is smaller than 0.3 and 0.5.
$^1/_{50} = {}^2/_{100}$ = 0.02 which is smaller than 0.09.
We know $^1/_{1000}$ is smaller than $^1/_{50}$ because it has a larger denominator.
We know $^5/_9$ is larger than ½ (=0.5) because 5 is more than half of 9.

So the order becomes:
$^1/_{1000}$ $^1/_{50}$ 9% 0.3 0.5 $^5/_9$

Example: Order from smallest to largest:
0.5 85% $^1/_{20}$ 10% 0.7

0.5 = 50% and 0.7 = 70% so these both come between 10% and 85%
10% = $^1/_{10}$ which is larger than $^1/_{20}$

So the order becomes:
$^1/_{20}$ 10% 0.5 0.7 85%

Exercise 49: Order the following from smallest to largest:

1. 0.02 $^1/_{1000}$ $^{99}/_{100}$ 13% 0.6

2. 0.4 ½ 75% ¼ 0.08

3. ¾ 1% 0.2 15% $^1/_{20}$

4. ½ 0.498 22% $^9/_{10}$ 2%

5. 20% 0.08 $^1/_{100}$ 5% 0.9

PERCENTAGES **ORDERING FRACTIONS, DECIMALS, AND PERCENTAGES**

6.These fractions, decimals and percentages can be put onto cards for you to place in size order.

5 %	0.1	15%	0.2
25%	0.3	1/3	38%
0.4	45%	1/2	0.55
60%	2/3	0.7	3/4
4/5	89%	9/10	0.98

PERCENTAGES **FINDING PERCENTAGES (%) OF QUANTITIES**

10% 25% 50% 1%

Remember:

50% = $\frac{1}{2}$ Divide by 2

25% = $\frac{1}{4}$ Divide by 4 or divide by 2 twice

10% = $\frac{1}{10}$ Divide by 10 (move the decimal point one place to the left)

1% = $\frac{1}{100}$ Divide by 100 (move the decimal point two places to the left)

Example
A leading chain of photographic stores require a 10% deposit. What is 10% of a camera's cash price of $420?

Answer: 10% of $420 = $42 deposit

Key Concept 18: Finding a percentage of a quantity.

Remember:

50% = $\frac{1}{2}$ 25% = $\frac{1}{4}$ 10% = $\frac{1}{10}$ 1% = $\frac{1}{100}$

PERCENTAGES

Exercise 50: Find 50%, 25% and 10% and 1% of these amounts:

	50% **100% ÷ =5 0%**	25% **100% ÷ = 25%**	10% **100% ÷ = 10%**	1% 100% ÷ = 1%
a) $30				
b) 40cm				
c) 20c				
d) 60mins				
e) $5.60				
f) 72km				
g) 90m				
h) $3.20				
i) $42.00				
j) $148				

Exercise 51: Find the deposit for the following:

	Price	Deposit
1. Microwave	$219	10%
2. Sports Cycle	$130	50%
3. Tool Kit	$90	25%
4. Greenhouse	$200	25%
5. Sewing Machine	$120	50%
6. Home Computer	$160	25%

PERCENTAGES **Finding (%) Percentages of Quantities: using 10% 25% 50% 1%**

These percentages can be used to calculate other percentages:
For example:

To find 5%: Find 10% and halve it
To find 20%: Find 10% and double it
To find 75%: Add 50% and 25% or multiply 25% by 3

Key Concept 19: Finding a percentage of a number 2

Use 'easy' percentages to piece it together

OR

Turn the percentage to a fraction or decimal and multiply

Exercise 52.

1. a) What is 10% of $240?

   b)What is 20% of $240?

   c) What is 50% of $240?

   d) What is 25% of $240?

   e) What is 75% of $240?

   f) What is 5% of $240?

   g) What is 1% of $240?

   h) What is 6% % of $240?

2. a) 20% of $45 b) 35% of $250

   c) 75% of $480 d) 15% of $900

   e) 80% of $640 f) 125% of $600

   g) 60% of $45 h) 45% of $90

3.

Find percentages for the following amounts. Start by solving the percentages you know first								
Whole Amount	**1%**	**2.5%**	**5%**	**10%**	**25%**	**50%**	**75%**	**80%**
$80								
$40								
$60								
$120								
$240								
$36								
$70								

Method 2: Convert percentage to a decimal or a fraction and multiply.

Example A
Find 20% of 40

20% = 20 ÷ 100 = 0.2 Write the percentage as a decimal
0.2 × 40 = 8.0 Multiply the decimal by the number (40)
Answer = 8

Example B
Find 42% of 130
$42\% = \frac{42}{100} = \frac{21}{50}$ Write the percentage as a fraction and simplify
$\frac{21}{5\cancel{0}} \times \frac{13\cancel{0}}{1} = \frac{273}{5}$ Multiply the fraction by the number (130). Simplify diagonally by 10. Multiply across.

Answer = 54.6 Divide to turn into a decimal

Exercise 53: Find the following percentages:

	A	B	C
1	8% of 425	5% of 1000	9% of 400
2	15% of 60	3% of 700	5% of 700
3	16% of 400	8% of 250	2% of 350
4	9% of 700	4% of 550	5% of 260
5	6% of 500	5% of 380	7% of 600
6	0.4% of 125	0.2% of 700	0.5% of 340
7	0.6% of 450	0.4% of 200	0.7% of 400

PERCENTAGES PERCENTAGE INCREASE OR DECREASE

If an amount increases by a percentage (eg a price increase), then we have to calculate the percentage and **add it on**.

If an amount decreases by a percentage (eg a percentage discount or sale price) then we have to calculate the percentage and **subtract it off**. Read the question carefully!

Exercise 54

1. A stereo that normally sells for $150.00 is on sale at 25% discount. What is the sale price?

2. A Unitec department has 6,200 students one semester. The following semester they have an increase of 6%. How many students do they have the following semester?

3. A bed normally costing $500 is on sale at 30% off. How much will it cost?

4. A house was worth $270,000. If there has been inflation of 15% since then what is the house worth now?

3. The charge for visiting the doctor is $32.00. If GST of 15% is added to this, what is the cost to the client?

PERCENTAGES **WRITING A PROPORTION AS A PERCENTAGE**

Think: What out of what? Write this as a fraction, then convert to a percentage using any method for converting a fraction to a percentage. It may be that you will simplify the fraction before finding an equivalent fraction with 100 on the bottom.

Example: In a class of 30 students, 27 are women. What percentage is this?

$$27 \text{ out of } 30 = \frac{27}{30} \div 3 = \frac{9}{10} \times 10 = \frac{90}{100} = 90\%$$

Key Concept 20: Writing an amount as a percentage

Think 'What out of what?' or What is the "part" and what is "the whole?"
Write as a fraction and make the fraction have a denominator out of 100, **or** change to a percentage by dividing the numerator by the denominator and multiplying by 100.

Exercise 55:

1. What is 30 as a percentage of 60?

   (Hint: treat this as 30 **out of** 60 then turn into a percentage.)

2. What is 5 as a percentage of 20?

3. There are 9 minutes of adverts in an hour of television. What percentage is adverts?

4. An evening class has 24 students. 18 are women. What percentage of the class are not women?

5. A 500ml solution contains 50ml of dextrose. What percentage of the solution is this?

6. A 1L solution contains 100ml of chlorhexidine. What percentage of the solution is this?

7. The total marks in an exam are 80. What percentages are:

   (a) 32 marks (b) 56 marks

   (c) 72 marks (d) 50 marks

8. A 250mL solution contains 50 mL of dextrose. What percentage of the solution is this?

9. A 250mL solution contains 25 ml of chlorhexidine. What percentage of the solution is this?

10. You have $36 in your wallet. If you spend $27 what percentage of your cash have you spent?

11. You have $1000 in the bank. You spend $125 on a new tyre. What percentage for your cash have you spent?

12. You are flatting with friends and you budget $600 for your expenses each week. If your rent is $140 per week, what is percentage of your budget is this

PERCENTAGES **PERCENTAGE PROBLEMS**

Exercise 56:

1. A dog on intravenous fluids has received 30% of the 500mL bag. How many mL has it received?

2. A cat that swallowed a string needs to have surgery to remove part of its small intestine. If 15cm are removed and the total length of the small intestine was 300cm, what percent of intestine did it lose?

3. White blood cells can be classified as one of 5 different types. The following table shows the counts for each type of cell from a batch with a total white blood cell count of 200. Work out what the percentage there were for each type.

	Type 1	Type 2	Type 3	Type 4	Type 5	Total
Count	60	70	14	16	40	200
Percentage						

Extension Problems:

3. A blood sample is diluted by placing 0.1mL of blood in a tube, and then filling the tube to the 20mL mark with a solution. What percentage of the final solution is the blood?

4. A dog weighs 60kg. It should only weigh 50kg. What fraction of its current weight does it need to lose? What percentage of its current weight is this?

PERCENTAGES

Revision: Conversions

Exercise 57: Change the following percentages to decimals:

(1)	50%	(2)	65%	(3)	4%	(4)	8.7%
(5)	63.25%	(6)	83.4%	(7)	$6\frac{1}{2}\%$	(8)	$32\frac{1}{4}\%$
(9)	58.06%	(10)	160%	(11)	330%	(12)	3.73%

Exercise 58: Change the following percentages to fractions and simplify:

(1)	50%	(2)	75%	(3)	55%	(4)	24%
(5)	37%	(6)	$12\frac{1}{2}\%$	(7)	$22\frac{1}{2}\%$	(8)	63%
(9)	$13\frac{1}{3}\%$	(10)	120%	(11)	170%	(12)	250%

Exercise 59: Change the following fractions to percentages:

(1)	¼	(2)	$^1/_{10}$	(3)	$^3/_5$	(4)	$^1/_8$
(5)	$^7/_{20}$	(6)	$^3/_2$	(7)	$^7/_{50}$		
(8)	$^{39}/_{100}$	(9)	$3\ ^1/_2$	(10)	$^{21}/_{20}$	(11)	$^9/_{40}$

Exercise 60: Change the following decimals to percentages:

(1)	0.7	(2)	0.45	(3)	0.53	(4)	0.725
(5)	3.9	(6)	0.837	(7)	1.75	(8)	0.07
(9)	0.008	(10)	1.104	(11)	9.7	(12)	0.0725

13. Macleans toothpaste (Triple stripe mildmint) contains 0.71% Sodium Monofluorophosphate, 0.13% Calcium Glycerophosphate and 0.014% Sodium Fluoride. Express these ingredients as fractions and decimals.

Revision: FRACTIONS

Exercise 61

1 Reduce the following fractions to their lowest terms.

(a) $\frac{4}{8}$ (d) $\frac{45}{100}$

(b) $\frac{12}{16}$ (e) $\frac{45}{500}$

(c) $\frac{56}{72}$ (f) $\frac{1600}{4000}$

2 Change the improper fractions to mixed numbers

(a) $\frac{8}{2}$ (b) $\frac{18}{12}$ (c) $\frac{1500}{250}$

3 Change the mixed numbers to improper fractions

(a) $1\frac{1}{3}$ (b) $10\frac{2}{5}$ (c) $4\frac{1}{4}$

4 Change to decimals, correct to two decimal places

(a) $\frac{9}{20}$ (d) $\frac{1}{6}$

(b) $\frac{17}{25}$ (e) $\frac{3}{7}$

(c) $\frac{7}{9}$

5 (a) $\frac{1}{6} \times \frac{7}{12}$ (b) $\frac{11}{12} \times \frac{1}{3}$ (c) $2 \times \frac{5}{12}$

6 (a) $\frac{1}{5}$ of 25 (b) $\frac{2}{5}$ of 350 (c) $\frac{3}{4}$ of 180

7 Change to fractions and simplify

(a) 0.2 (d) 0.37

(b) 0.4 (e) 3.03

(c) 0.125 (f) 0.055

Revision: PERCENTAGES

Exercise 62

1. Express as percentages
   (a) 0.25 (b) 1.625 (c) 24.37

2. Express as a decimal
   (a) 35% (b) 6% (c) 75%

3. Express as percentages
   (a) $\frac{1}{4}$ (b) $\frac{1}{5}$ (c) $\frac{1}{20}$
   (d) $\frac{7}{25}$ (e) $\frac{13}{20}$ (f) $\frac{1}{100}$

4 Change to a fraction and simplify
   (a) 30% (b) 150% (c) 43%
   (d) 0.7% (e) 0.03% (f) 0.05%
   (g) $\frac{1}{2}$% (h) $3\frac{1}{2}$% (i) $17\frac{1}{2}$%

5

Percentage	50	25		5	2			4			
Equivalent Fraction	$\frac{1}{2}$						$\frac{4}{5}$		$\frac{12}{25}$		
Decimal Fraction	0.5		0.78			12.5				0.3	0.09

6 Find
   (a) 20% of 40 (b) 10% of 60 (c) 25% of 60

DRILL 1 **Unit Conversions**

Convert to grams: (g)

1kg	0.5kg	1000g	500g
0.02kg	0.08kg	20g	80g
1.5kg	15kg	1500g	15000g
120kg	3.75kg	120000g	3750g
0.008kg	0.025kg	8g	25g
645mg	250mg	0.645g	0.25g
1000mg	500mg	1g	0.5g
50mg	5mg	0.05g	0.005g
600 000 mg	65mg	600g	0.065g
O.6mg	7.5mg	0.0006g	0.0075g
120 mg	700 000mg	0.12 g	700g
1000 000mcg	700 000µg	1g	0.7g
1billion ng	700 000ng	1g	0.0007g

DRILL 2

Unit Conversions

Convert to milligrams (mg):

5g	0.5g	5000mg	500mg
54g	5.4g	54000mg	5400mg
0.06g	0.005g	60mg	5mg
500g	5.875g	500000mg	5875mg
6.25g	625g	6250mg	625000mg
1000mcg	8 000 mcg	1mg	8mg
700mcg	102 mcg	0.7mg	0.102mg
75µg	50 mcg	0.075mg	0.05mg
42.5mcg	640 000ng	0.0425mg	0.64mg
36g	2.8g	36000mg	2800g

Convert to micrograms (mcg or µg)

0.000 001g	0.001mg	1mcg	1µg
0.3mg	3.2mg	300mcg	3200µg
27mg	3200ng	27000mcg	3.2mcg

DRILL 3 **Unit Conversions**

Convert to millilitres (mL):

300L	45L	300 000mL	45000mL
8L	8.5L	8000mL	8500mL
2.75L	0.5L	2750mL	500mL
0.1L	1dL	100mL	100mL
0.87L	0.04L	870mL	40mL
0.056L	0.003L	56mL	3mL
6dL	3dL	600 mL	300mL
0.3dL	0.03dL	30 mL	3mL
6.7dL	0.25 dL	670mL	25mL

Convert to decilitres (dL)

0.1L	100mL	1dL	1dL
30L	3.6L	300dL	36dL
0.45L	0.07L	4.5dL	0.7dL
1000mL	100mL	10dL	1dL
250mL	25 mL	2.5dL	0.25dL
1mL	0.2mL	0.01dL	0.002dL

DRILL 4 **2× – 9×**

8 × 8 =	6 × 3 =	7 × 7 =	64	18	49
5 × 6 =	8 × 9 =	8 × 4 =	30	72	32
6 × 6 =	5 × 4 =	3 × 7 =	36	20	21
3 × 4 =	1 × 9 =	3 × 5 =	12	9	15
2 × 4 =	8 × 8 =	9 × 6 =	8	64	54
5 × 7 =	9 × 5 =	8 × 5 =	35	45	40
4 × 9 =	9 × 9 =	7 × 4 =	36	81	28
7 × 7 =	5 × 6 =	8 × 6 =	49	30	48
9 × 3 =	8 × 5 =	6 × 6 =	27	40	36
7 × 8 =	7 × 6 =	2 × 6 =	56	42	12
9 × 7 =	6 × 8 =	3 × 2 =	63	48	6
8 × 9 =	8 × 2 =	4 × 4 =	72	16	16
7 × 8 =	9 × 3 =	6 × 4 =	56	27	24
10 × 7 =	5 × 5 =	3 × 8 =	70	25	24

Attempt no	1	2	3	4	5	6	7
Date:							
Time taken:							
Number correct /42							

DRILL 5

÷

27 ÷ 9 =	25 ÷ 5 =	40 ÷ 8 =	3	5	5
24 ÷ 6 =	27 ÷ 3 =	45 ÷ 9 =	4	9	5
70 ÷ 7 =	14 ÷ 2 =	8 ÷ 8 =	10	7	1
54 ÷ 6 =	28 ÷ 4 =	28 ÷ 7 =	9	7	4
28 ÷ 4 =	49 ÷ 7 =	32 ÷ 4 =	7	7	8
35 ÷ 5 =	30 ÷ 5 =	21 ÷ 7 =	7	6	3
16 ÷ 8 =	18 ÷ 2 =	18 ÷ 6 =	2	9	3
36 ÷ 9 =	10 ÷ 5 =	40 ÷ 10 =	4	2	4
9 ÷ 9 =	30 ÷ 10 =	48 ÷ 6 =	1	3	8
35 ÷ 7=	40 ÷ 4 =	24 ÷ 3 =	5	10	8
12 ÷ 6 =	56 ÷ 8 =	18 ÷ 6 =	2	7	3
90 ÷ 9 =	12 ÷ 2 =	30 ÷ 6 =	10	6	5
63 ÷ 7 =	12 ÷ 3 =	81 ÷ 9 =	9	4	9
72 ÷ 8 =	24 ÷ 8 =	36 ÷ 6 =	9	3	6

Attempt no	1	2	3	4	5	6	7
Date:							
Time taken:							
No. correct							

DRILL 6 **25× ÷**

25 × 4 =	25 × 20 =	25 × 25 =	100	500	625
25 × 7 =	100 ÷ 25 =	175 ÷ 25 =	175	4	7
25 × 6 =	25 × 19 =	25 × 8 =	150	475	200
25 × 2 =	300 ÷ 25	600 ÷ 25 =	50	12	24
25 × 12 =	25 × 11 =	375 ÷ 25 =	300	275	15
25 × 5 =	200 ÷ 25 =	400 ÷ 25 =	125	8	16
25 × 14 =	25 × 23 =	25 × 24 =	350	575	600
25 × 9 =	25 × 11 =	150 ÷ 25 =	225	275	6
25 × 22 =	75 ÷ 25 =	275 ÷ 25 =	550	3	11
25 × 17 =	25 × 15 =	550 ÷ 25 =	425	375	22
25 × 3 =	350 ÷ 25 =	325 ÷ 25 =	75	14	13
25 × 10 =	25 × 16 =	50 ÷ 25 =	250	400	2
25 × 21 =	25 × 13 =	500 ÷ 25 =	525	325	20
25 × 18 =	250 ÷ 25 =	25 ÷ 25 =	450	10	1

DRILL 7

dividing with zeros

210 ÷ 3 =	1500 ÷ 300 =	2700 ÷ 30 =	70	5	90
1500 ÷ 5 =	3200 ÷ 800 =	1400 ÷ 200 =	300	4	7
3600 ÷ 600 =	24000 ÷ 40 =	28000 ÷ 40 =	6	600	700
1800 ÷ 2 =	5600 ÷ 70 =	490 ÷ 70 =	900	80	7
1200 ÷ 300 =	800 ÷ 200 =	3000 ÷ 50 =	4	4	60
3200 ÷ 40 =	6300 ÷ 90 =	18000 ÷ 20 =	80	70	900
800 ÷ 40 =	4000 ÷ 20 =	1000 ÷ 50 =	20	200	20
360 ÷ 60 =	300 ÷ 60 =	300 ÷ 10 =	6	5	30
63 000 / 900	400 000 / 400	1 200 000 / 40 000	70	1000	30
40 000 / 800	56 000 / 80	1 500 000 / 3 000	50	700	500
60 000 / 3 000	120 000 / 2 000	36 000 / 600	20	60	60
160 000 / 40	45 000 / 900	240 000 / 4 000	4 000	50	60

DRILL 8 **multiplying with decimals**

2 × 0.6 =	0.5 × 0.07 =	0.2 × 6.5 =	1.2	0.035	1.3
3 × 0.3 =	0.7 × 0.08 =	2.5 × 0.6 =	0.9	0.056	1.5
5 × 0.8 =	0.03 × 0.05 =	0.08 × 0.04 =	4	0.0015	0.0032
4 × 0.7 =	0.7 × 8 =	0.1 × 58 =	2.8	5.6	5.8
3 × 0.9 =	0.06 × 0.7 =	0.7 × 0.3 =	2.7	0.042	0.21
2 × 0.08 =	0.02 × 8 =	0.6 × 0.8 =	0.16	0.16	0.48
3 × 0.06 =	0.6 × 0.1 =	0.01 × 0.01 =	0.18	0.06	0.0001
5 × 0.02 =	0.09 × 0.06 =	0.01 × 0.07 =	0.1	0.0054	0.0007
2 × 0.05 =	0.3 × 0.02 =	0.3 × 0.2 =	0.1	0.006	0.06
6 × 0.4 =	1.5 × 0.2 =	1.2 × 0.03 =	2.4	0.3	0.036
8 × 0.3 =	0.04 × 0.1 =	0.06 × 0.8 =	2.4	0.004	0.048
7 × 0.05 =	0.5 × 0.9 =	0.07 × 0.06 =	0.35	0.45	0.0042
5 × 0.08 =	0.4 × 0.3 =	9 × 0.08 =	0.4	0.12	0.72
0.3 × 0.2 =	0.09 × 0.6 =	5 × 0.007 =	0.06	0.054	0.035

DRILL 9 **dividing with decimals**

1.2 ÷ 3 =	0.35 ÷ 5 =	4.2 ÷ 7 =	0.4	0.07	0.6
2.5 ÷ 5 =	0.24 ÷ 4 =	0.035 ÷ 5 =	0.5	0.06	0.007
4.8 ÷ 6 =	0.36 ÷ 9 =	7.2 ÷ 8 =	0.8	0.04	0.9
0.6 ÷ 3 =	0.48 ÷ 8 =	2.4 ÷ 4 =	0.2	0.06	0.6
2.8 ÷ 4 =	0.45 ÷ 5 =	2 ÷ 5 =	0.7	0.09	0.4
1.5 ÷ 5 =	0.072 ÷ 8 =	3 ÷ 2 =	0.3	0.009	1.5
5.4 ÷ 6 =	0.018 ÷ 3 =	0.0025 ÷ 5 =	0.9	0.006	0.0005
1.8 ÷ 9 =	0.36 ÷ 6 =	5.6 ÷ 7 =	0.2	0.06	0.8
3.2 ÷ 4 =	4 ÷ 5 =	0.024 ÷ 3 =	0.8	0.8	0.008
4.2 ÷ 6 =	1.6 ÷ 4 =	3 ÷ 5 =	0.7	0.4	0.6
2.8 ÷ 7 =	2.5 ÷ 5 =	0.15 ÷ 5 =	0.4	0.5	0.03
4.5 ÷ 5 =	0.14 ÷ 7 =	2.1 ÷ 7 =	0.9	0.02	0.3
4.0 ÷ 8 =	4.2 ÷ 6 =	0.036 ÷ 6	0.5	0.7	0.006
0.56 ÷ 7 =	0.36 ÷ 12 =	0.14 ÷ 2 =	0.08	0.03	0.07

DRILL 10 **dividing by a decimal**

1.2 ÷ 0.3 =	0.35 ÷ 0.05 =	4.2 ÷ 0.07 =	4	7	60
2.5 ÷ 0.5 =	0.24 ÷ 0.4 =	0.035 ÷ 0.5 =	5	0.6	0.07
4.8 ÷ 0.06 =	0.36 ÷ 0.9 =	7.2 ÷ 0.08 =	80	0.4	90
0.6 ÷ 0.003 =	0.48 ÷ 0.8 =	24 ÷ 0.04 =	200	0.6	600
2.8 ÷ 0.04 =	0.45 ÷ 0.5 =	2 ÷ 0.5 =	70	0.9	4
1.5 ÷ 0.05 =	0.072 ÷ 0.8 =	3 ÷ 0.2 =	30	0.09	15
5.4 ÷ 0.6 =	0.018 ÷ 0.3 =	0.0025 ÷ 0.05 =	9	0.06	0.05
1.8 ÷ 0.9 =	0.36 ÷ 0.06 =	5.6 ÷ 0.07 =	2	6	80
3.2 ÷ 0.04 =	4 ÷ 0.05 =	0.024 ÷ 0.3 =	80	80	0.08
4.2 ÷ 0.006 =	1.6 ÷ 0.04 =	3 ÷ 0.05 =	700	40	60
2.8 ÷ 0.7 =	2.5 ÷ 0.5 =	0.15 ÷ 0.0005 =	4	5	300
4.5 ÷ 0.05 =	14 ÷ 0.7 =	2.1 ÷ 0.007 =	90	20	300
4.0 ÷ 0.08 =	42 ÷ 0.6 =	36 ÷ 0.6	50	70	60
0.56 ÷ 0.07 =	0.36 ÷ 1.2 =	14 ÷ 0.002 =	8	0.3	7000

DRILL 11 **multiplying/dividing with zeros/decimals**

0.8 × 200 =	2000 × 0.6 =	350 ÷ 0.5 =	160	1200	700
0.06 × 60 =	300 × 0.3 =	240 ÷ 0.04 =	3.6	90	6000
0.7 × 5000 =	50 000 × 0.8 =	3.6 ÷ 0.9 =	3500	40000	4
30 × 0.004 =	4000 × 0.07 =	4800 ÷ 0.8 =	0.12	280	6000
0.9 × 20 =	300 × 0.9 =	0.45 ÷ 0.005 =	18	270	90
7000 × 0.5 =	2000 × 0.08 =	7200 ÷ 0.8 =	3500	160	9000
0.002 × 600 =	30 × 0.06 =	18000 ÷ 0.03 =	1.2	1.8	600 000
800 × 0.3 =	500 × 0.02 =	36 ÷ 0.06 =	240	10	600
0.9 × 700 =	20 × 0.05 =	40 ÷ 0.05 =	630	1	800
0.0003 × 40 =	60 × 0.04 =	1.6 ÷ 0.0004 =	0.012	2.4	4000
0.6 × 70 =	8000 × 0.3 =	25000 ÷ 0.5 =	42	2400	50 000
0.002 × 300 =	70 × 0.05 =	140 ÷ 0.7 =	0.6	3.5	200
4000 × 0.6 =	500 × 0.08 =	4200 ÷ 0.6 =	2400	40	7000
0.9 × 200 =	0.3 × 200 =	360 ÷ 0.09 =	180	60	4000

MEASUREMENT

ANSWERS

Exercise 1

Measured feature	Unit of measure used	Symbol for unit of measure
length	metre	m
time	second	s
mass	gram	g
area	square metre	m^2 (or occasionally sqm)
liquid capacity	litre	L
volume	cubic metre (or you can use litres instead if measuring volume of a liquid)	m^3
temperature	degree Celsius	^oC
speed	kilometre per hour	km/h

Measured feature	Units of Measure used	Symbol
a) The height of the classroom	metres	m
b) The distance from Auckland to Whangarei	kilometres	km
c) The thickness of your little finger	millimetres	mm
d) The weight of your textbook	grams or kilograms	g or kg
e) The amount of water in a fish tank	litres	L
f) The weight of an aircraft	tonnes	t
g) The amount of medicine on one spoon	millilitres	mL
h)The amount of wine in a standard bottle	millilitres	mL
i) The length of a football field	metres	m
j) The amount of water in a bath	litres	L
k) The weight of a mouse	grams	g
l) The thickness of a piece of wire	millimetres	mL
m) The capacity of a milk bottle	millilitre	mL
n) The diameter of a 10 cent piece	millimetres or centimetres	mm or cm
o) The amount of water in a raindrop	millilitres or microlitres	mL or µL
p) A quantity of apples	kilogram	kg

Exercise 2

1. 50L 2. 300ml 3. 26cm 4. 2L 5. 4m 6. 200cm 7. 3kg 8. 200g
9. 1kg 10. 150cm 11. 15cm 12. 20g

Exercise 3

Question 1 of Exercise 3
P = 1.75 Amps
Q = 2.6 Volts
R = 0.03 m
S = 0.28 m

Question 2 of Exercise 3
A = 0.5 Amps
B = 2.5 Amps
C = 175 Pascals

Question 3 of Exercise 3
A = -6 °C
B = 140 Pascals
C = 60 mL

Question 4 of Exercise 3
P = 0.2 mR/hr
Q = 1.5 mR/hr
R = 40 mR/hr
S = 580 kHz
T = 720 kHz
U = 950 kHz

Question 5 (your approximations may differ slightly).
D = 5 kPa (approx.)
E = 18 kPa (approx.)
F = 36 kPa (approx.)
G = 0.26 Newtons (approx.)
H = 0.52 Newtons (approx.)

Question 7 of Exercise 3

a = 18 °C
b = 21.2 °C (approx.)
c = 26.4 °C approx.)
d = 21 °C
e = 17 °C
f = 15 °C
g = 10 °C
h = 8.5 °C
i = 5.5 °C
j = 1.5 °C
k = 33.8 °C
l = 32.6 °C
m = 31.2 °C
n = 32.5 °C

Exercise 4

1. a) 3cm b) 6cm c) 7.5cm d) 24cm e) 25cm f) 27.8cm g) 60mm
h) 85mm i) 93mm j) 1.5m k) 3.25m l) 5m m) 72m n) 76m
o) 77m p) 48m q) 50m r) 56m

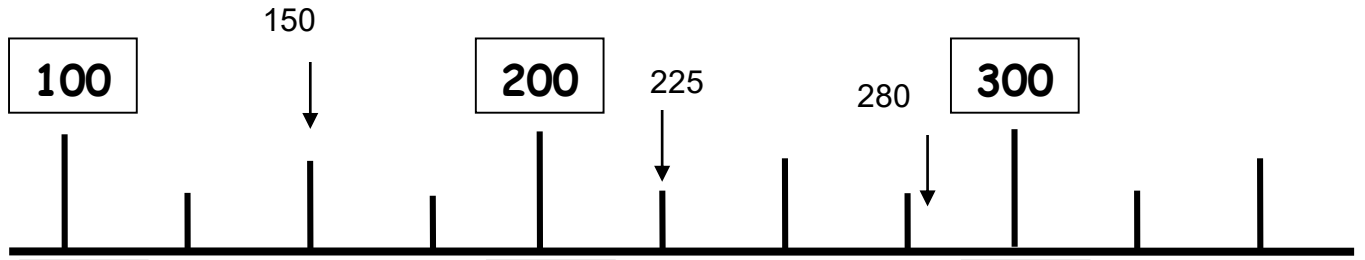
2. a) 40mL b) 100mL c) 140mL d) 175mL
e) 375mL f) 225mL g) 150mL h) 50mL
i) 0.7L j) 0.5L k) 0.2L l) 0.05L
m) 3L n) 4.5L o) 7.5 p) 470 g

3. a) 100g = 0.1kg b) 1150g = 1.15kg c) 2300g = 2.3kg d) 3400g = 3.4kg
e) 4320g = 4.32kg f) 4480g = 4.48kg

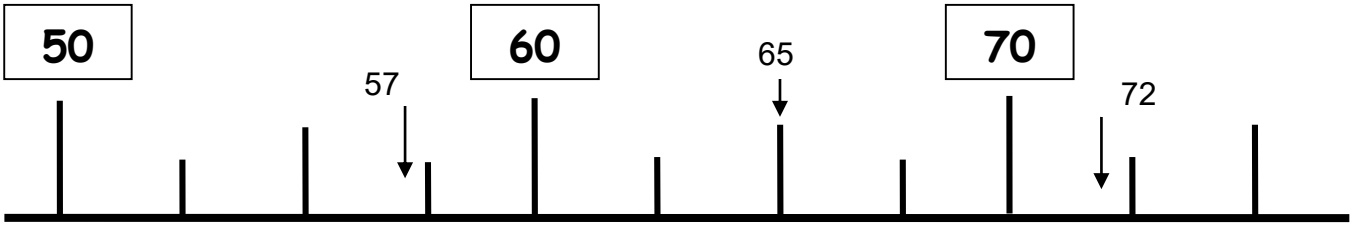
4. A=106cm B=650mL C=140g D=-4°C E=180Pa F=-8°C
P=0.6 Ohms Q=2.2 Ohms R=14.2cm S=15.6cm T=2.5A U=0.5A
V=0.26N W=0.52N X=2.25V
Y=3.54m Z=3.78m

5.

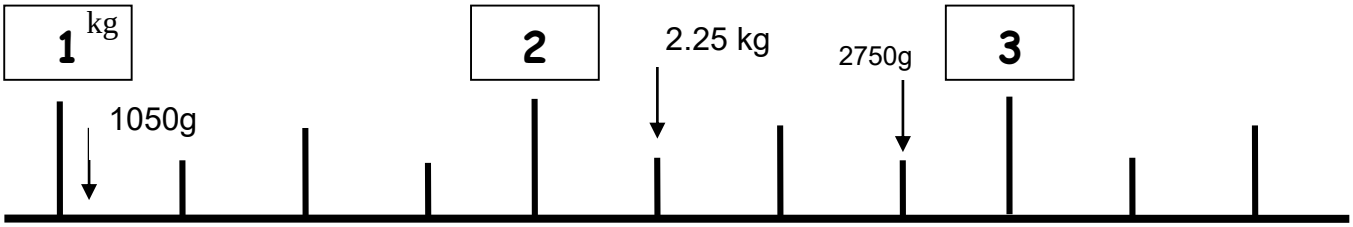
A.



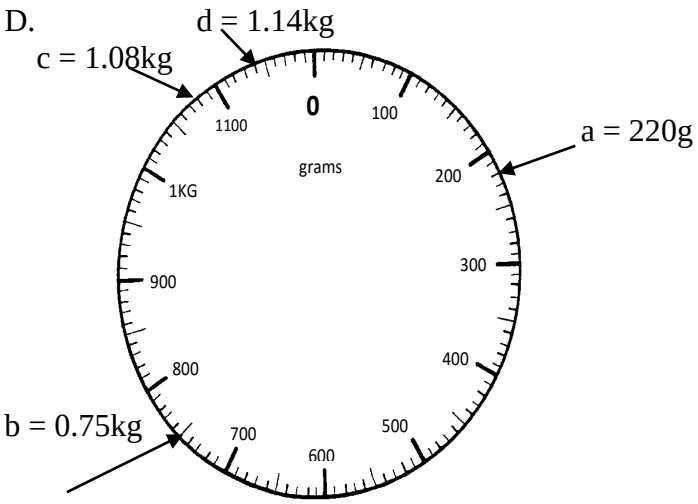
B.



C.



D.



Exercise 5

A = 1.5mL B = 1.5mL C = 1.7mL D = 0.5mL E = 0.6mL F = 0.4mL G = 1.9mL
H = 2mL I = 1mL J = 2.4mL K = 2mL L = 1.7mL M = 2.5mL

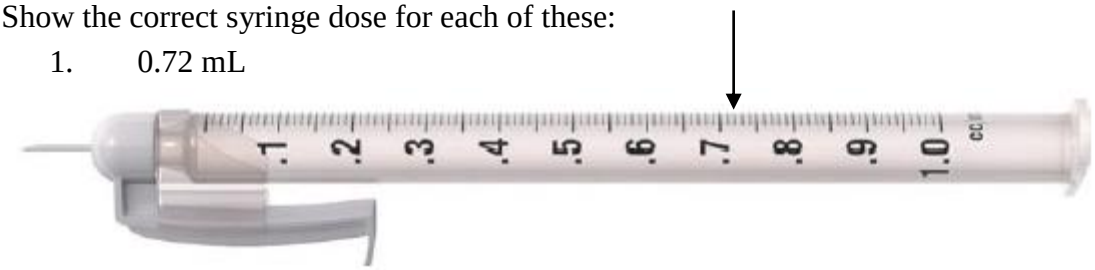
Exercise 6

Syringe size	35 mL	12 mL	5 mL	3 ml	1 mL
Gap between calibration lines	1 mL	0.2 mL	0.2 mL	0.1 mL	0.01 mL

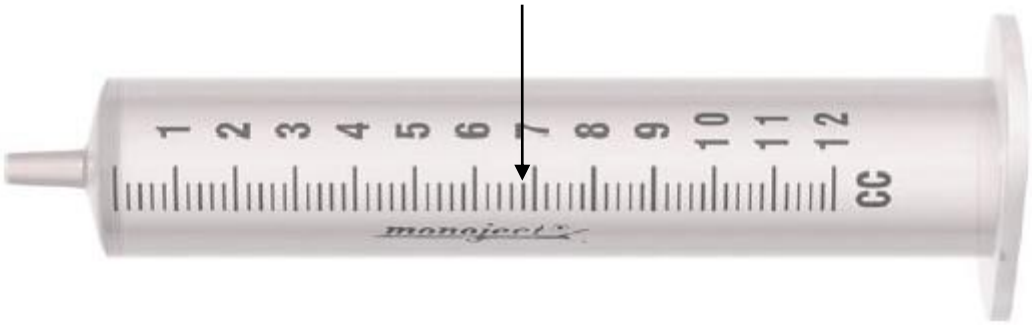
Exercise 15

Show the correct syringe dose for each of these:

1. 0.72 mL



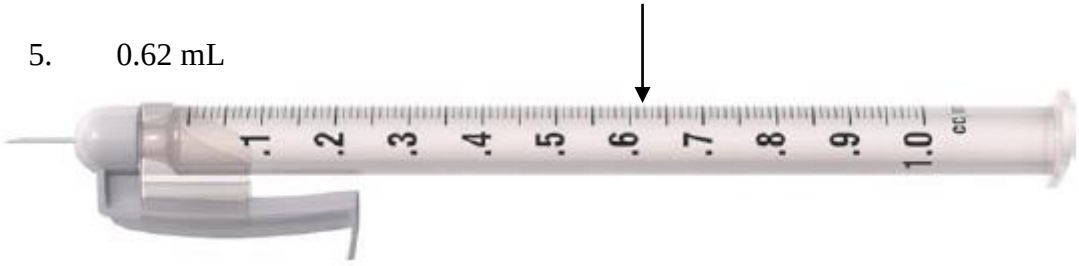
2. 6.8 mL



3. 2.8 mL

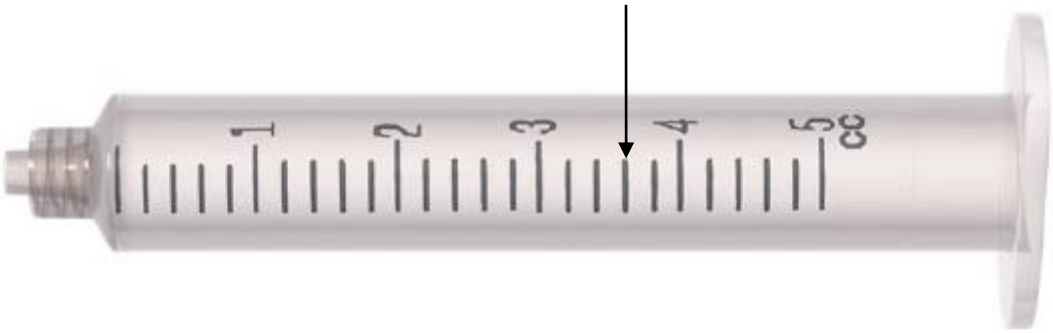
4. 4.4 mL

5. 0.62 mL

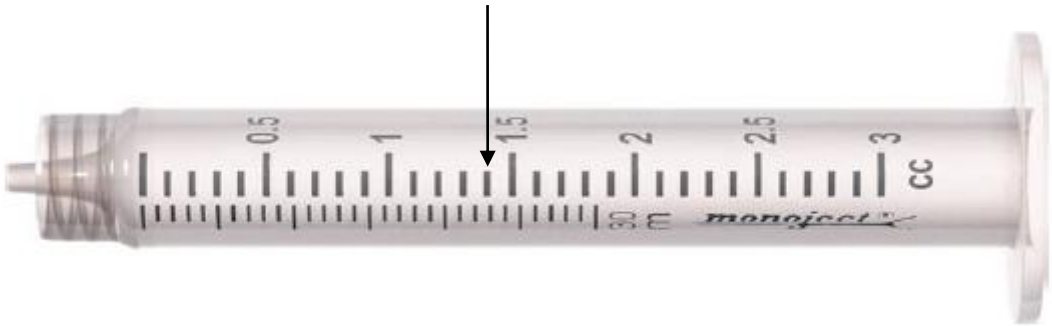


6. 28 units

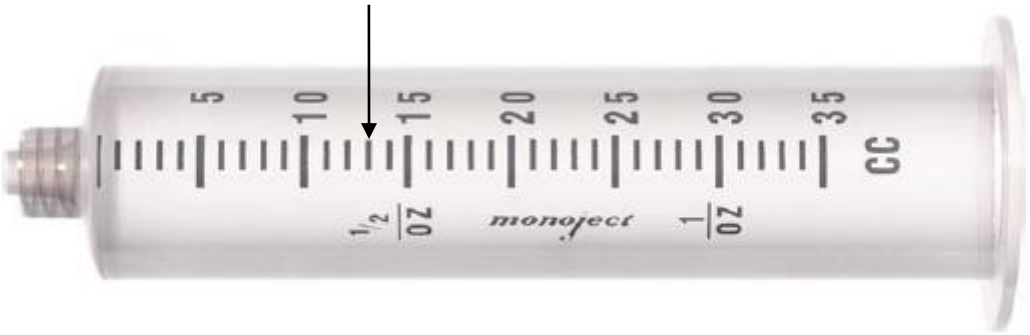
7. 3.6 mL



8. 1.4 mL

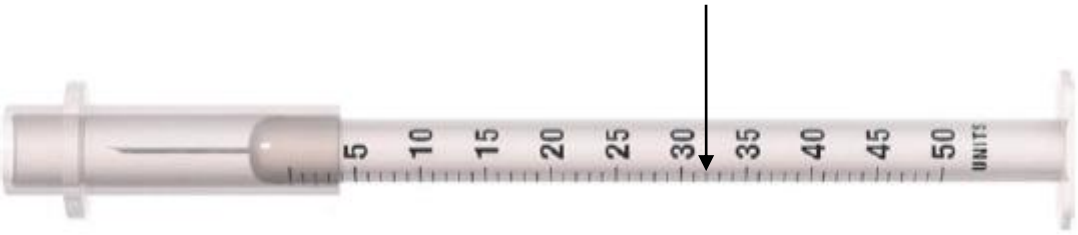


9. 13 mL

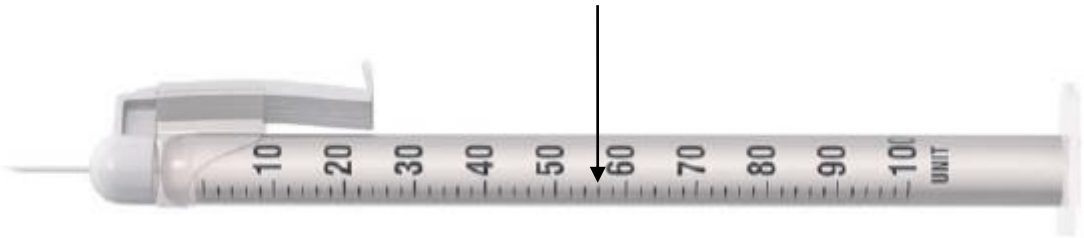


10. 9.6 mL

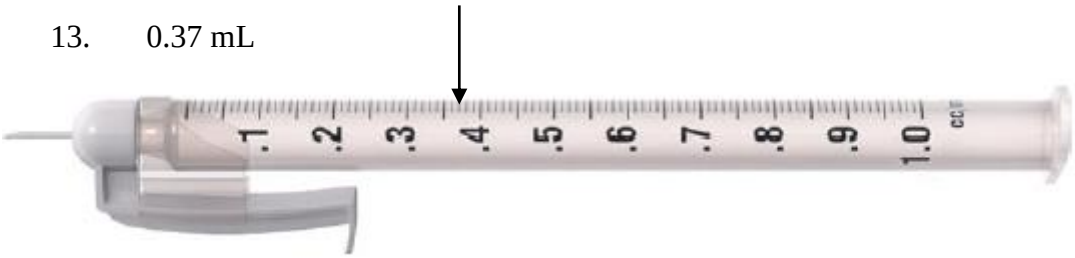
11. 32 units



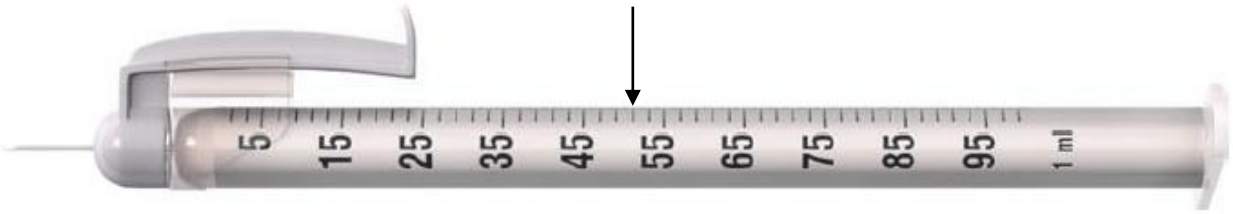
12. 56 units



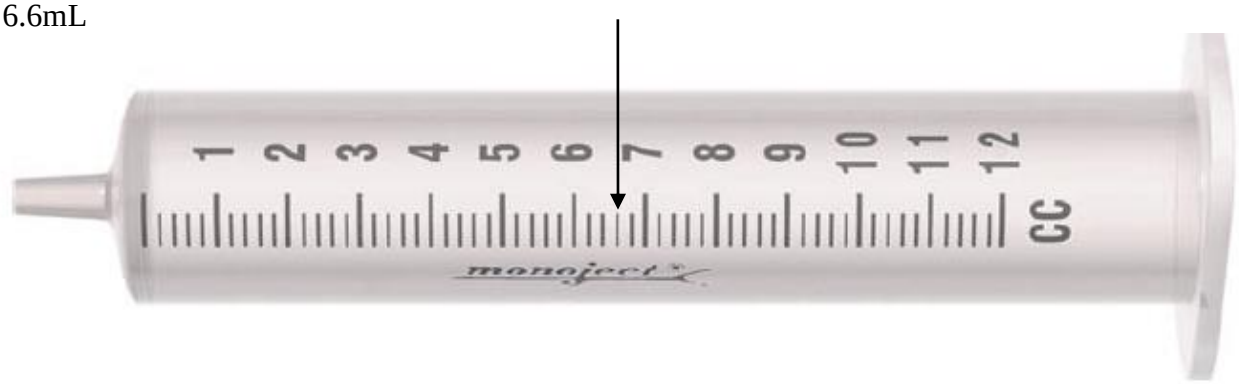
13. 0.37 mL



14. 51 units

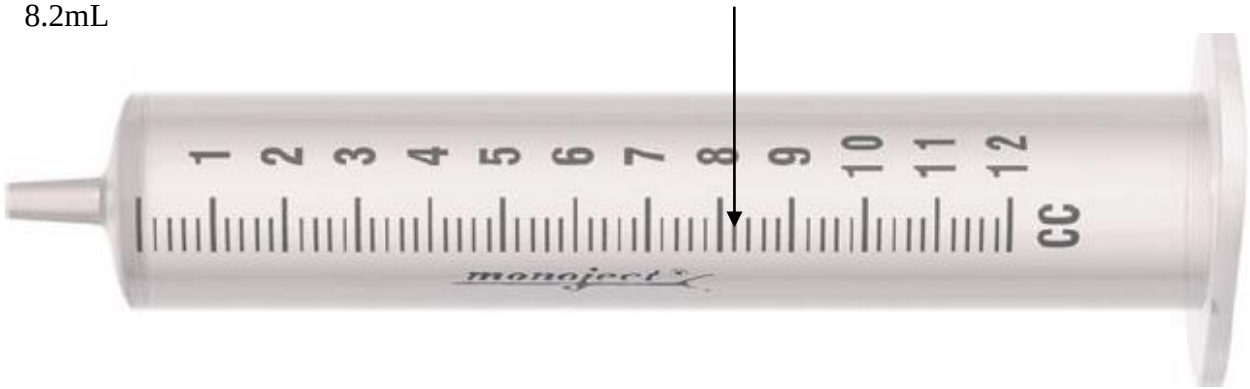


15. 6.6mL



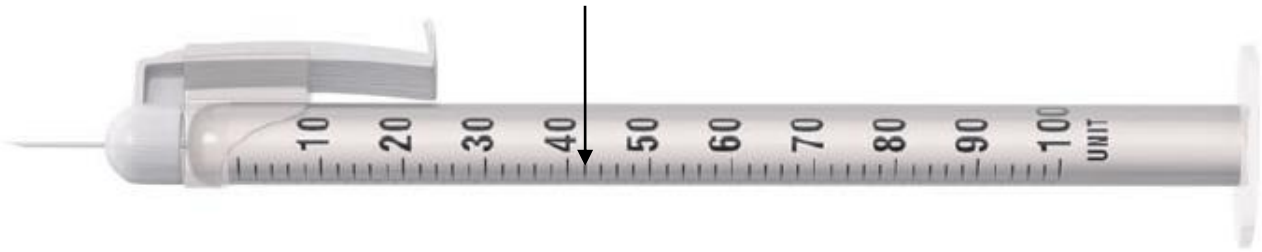
16. 0.72mL

17. 8.2mL



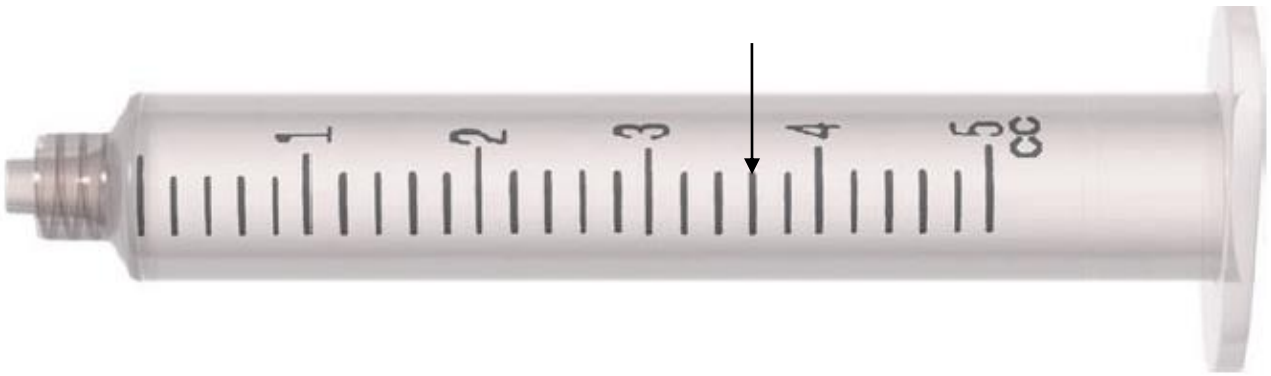
18. 27mL

19. 42 units

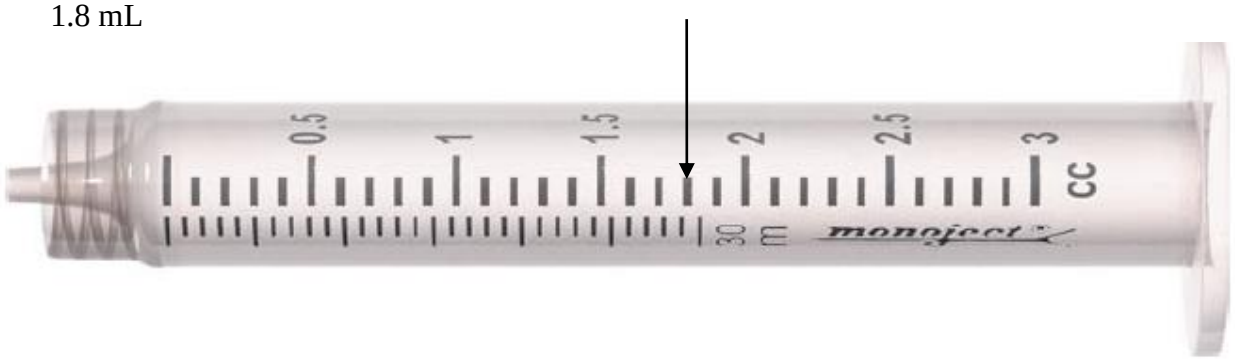


20. 14 units

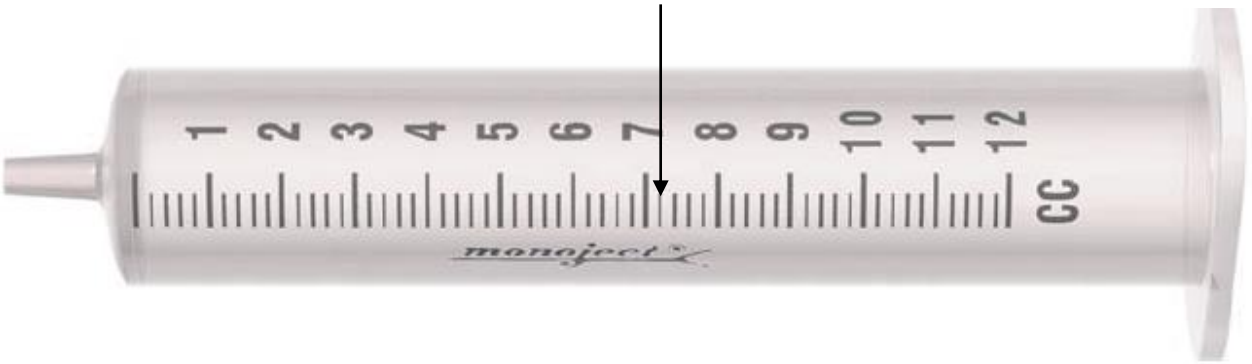
21. 3.6 mL



22. 1.8 mL



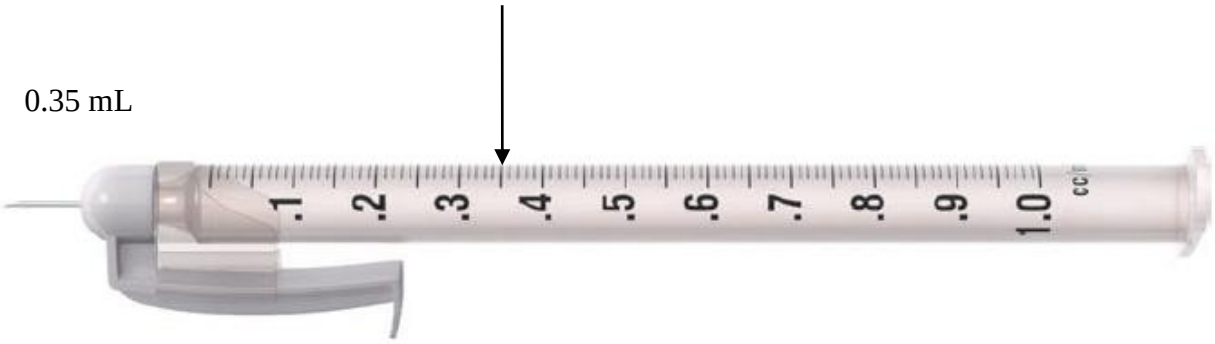
23. 7.2 mL



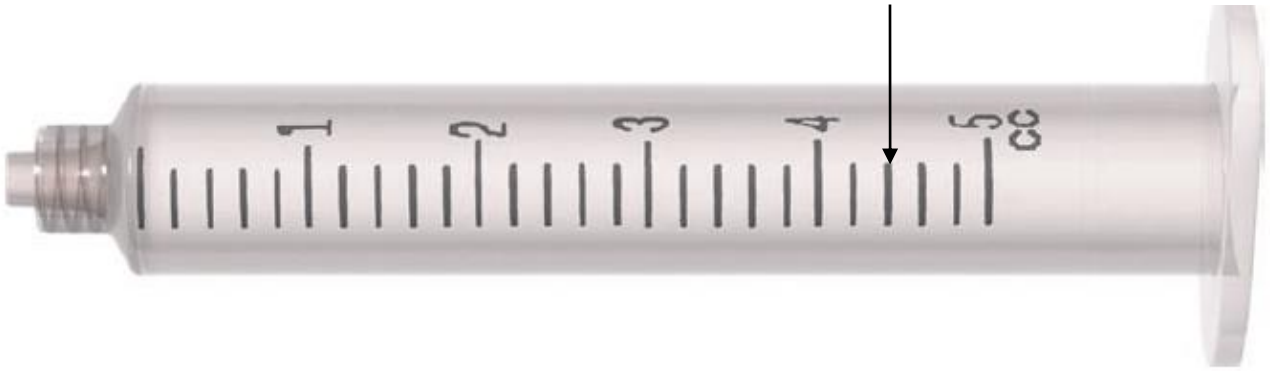
24. 16 mL

25. 12 units

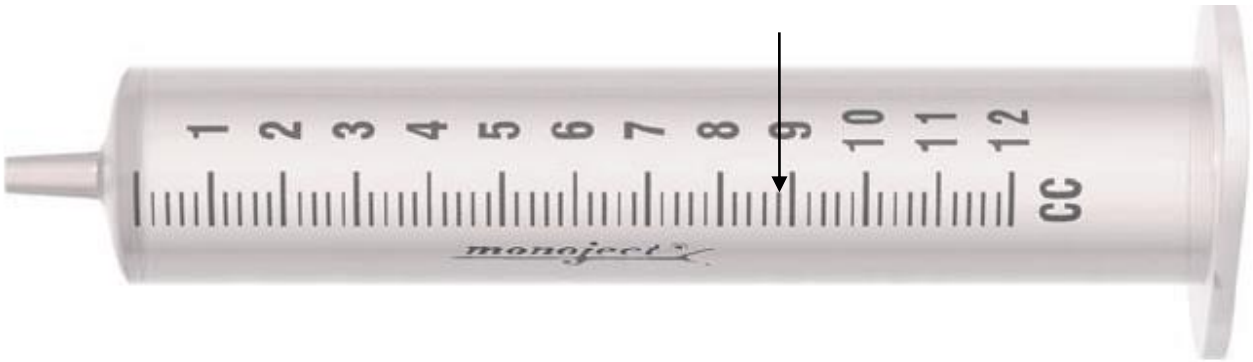
26. 0.35 mL



27. 4.4mL



28. 8.8 mL



29. 22 mL

Exercise 8

1. a) 1000 b) 1000 c) 1000 d) 1000 e) 10 f) 100 g) 1000 h) 1000
2. a) bigger, multiply b) smaller, divide

Exercise 9

1 a) 6g=6000mg b) 26.8g=26800mg c) 3.924g=3924mg
d) 405g=405000mg

2 a) 1200mg=1.2g b) 650mg=0.65g c) 6749mg=6.749g
d) 3554mg=3.554g

3 a)120mcg=0.12mg b) 1001mcg=1.001mg c)2675 mcg= 2.675mg
d) 12034mcg=12.034mg

4 a) 1.67g=1,670,000mcg b) 0.85g=850,000mcg
c) 125 mcg= 0.000125g d) 6784mcg=0.006784g
e) 48.9mg=48,900,000ng f) 3084ng=0.003084mg

5 a) 10ml=0.01 litres b) 132ml=0.132 litres c) 2398ml = 2.389 litres
d) 123.4ml=0.1234 litres

6 a) 4litres=4000ml b) 6.2litres=6200ml c) 0.94litres=940ml
d) 12.27litres=12270ml

7 a) 140 milligrams b) 0.14 grams c) 1400mcg = 1.4mg, need 140mg so no not enough

MEASUREMENT

Exercise 10

1. a)	70	b)	1070	c)	2370
2. a)	2	b)	15	c)	290
3. a)	4.5	b)	0.005162	c)	0.000014608
4. a)	4200	b)	0.253	c)	0.005960
5. a)	2030 000	b)	52 300	c)	0.065
6. a)	250 000 000	b)	2 750 000	c)	5650
7. a)	5.205	b)	0.25		
8. a)	375,000	b)	4250	c)	60

Exercise 11

1. 258 cm = 2580 mm = 2.58 m
2. 134.02 mm = 13.402 cm = 0.13402 m
3. 13.155 m or 1315.5 cm or 13155 mm
4. 8.89205 m or 8892.05 mm

Exercise 12

1. 2.956 L or 2956 mL
2. 59.7903 L or 59790.3 mL
3. 4.975 L or 4795 mL

4. a) 5L	b) 1L	c) 0.1L	d) 0.5L	e)1.5L	f) 0.8L	
5. a) 100 mL	b) 1500mL	c) 500mL	d) 50mL	e) 25mL	f) 1000mL	
6. a) 1 dL	b) 3.5 dL	c) 0.36 mL	d) 0.1dL	e) 0.5mL	f) 10dL	
7. a) 10 dL	b) 7.5 dL	c) 18 dL	d) 5 dL	e) 25 dL	f) 16.5 dL	
8. a) 2.5 dL	b) 25 dL	c) 1.3 dL	d) 17.5 dL	e) 13.5 dL	f) 1.25 dL	

Exercise 13

1.	9.843 mg	=	0.009843 g	=	9843 mcg
2.	4.68 kg	=	4680 g	=	4680000 mg
3.	9376 mcg	=	9.376 mg	=	0.009376 g
4.	0.45 kg	=	450 g	=	450000 mg
5.	1.4363 mg	=	0.0014363 g	=	1436.3 mcg

6. 1.403617 kg or 1403.617 g or 1403617 mg
7. 0.9498 g or 949.8 mg
8. 7.781 kg or 7781 g
9. 1.713601 g or 1713.601 mg or 1713601 mcg
10. 1.292207g or 1292.207 mg or 1292207 mcg

No Exercise 14 or 15 included in this workbook

Exercise 16

1. a) 5 a.m. c) 5.45 a.m. e) 12 p.m.
   b) 7.30 p.m. d) 10.15 a.m. f) 11.55 p.m.

2. a) 2 hr 30 min = 2.5 hours = 2½ hours
   b) 35 min
   c) 7 hours
   d) 2 hours 15 min = 2.25 hours = 2¼ hours
   e) 1 hr 30 min = 1.5 hr = 1½ hr
   f) 1 hr 15 min = 1.25 hr = 1¼ hr
   g) 1 hr 45 min = 1.75 hr = 1¾ hr
   h) 13 hr 35 min

(3) 12.01 p.m. (4) 2.49 p.m. (5) 12.35 p.m.

Exercise 17

1. a) 1430 hours (c) 1200 hours (e) 2355 hours
   b) 0330 hours (d) 2345 hours (f) 0915 hours

2. a) 6 a.m. (c) 10.45 a.m. (e) 6.55 p.m.
   b) 1.13 p.m. (d) 9.35 a.m. (f) 10.55 p.m.

3. 2 hr 10 min
4. 1 hr 40 min
5. 1255 hr = 12.55 p.m.

Exercise 18

1. 240 min 2. 1500 sec 3. 9000 sec 4. ½ hour or 0.5 hours 5. $1^1/_3$ hours or 1.33 hours
6. 153 min 7. 48 min 8. 180 + 36 = 216 min 9. 2 hours 24 min = 2.4 hours

(no answers provided here for Ex 19 and Ex 20)

Exercise 21

	A	B	C
1.	$\frac{2}{3}$	$\frac{5}{7}$	$\frac{7}{8}$
2.	$\frac{5}{7}$	$\frac{5}{6}$	$\frac{2}{3}$
3.	$\frac{3}{8}$	$\frac{4}{5}$	$\frac{3}{7}$
4.	$\frac{1}{2}$	$\frac{3}{7}$	$\frac{8}{9}$
5.	$\frac{3}{4}$	$\frac{3}{10}$	$\frac{2}{5}$
6.	$\frac{1}{3}$	$\frac{9}{14}$	$\frac{18}{25}$
7.	$\frac{2}{3}$	$\frac{4}{5}$	$\frac{3}{10}$
8.	$\frac{7}{8}$	$\frac{13}{16}$	$\frac{4}{9}$

Exercise 22

	A	B	C
1.	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{2}{15}$
2.	$\frac{3}{8}$	$\frac{5}{12}$	$\frac{8}{35}$
3.	$\frac{3}{10}$	$\frac{5}{16}$	$\frac{3}{10}$
4.	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{4}{25}$
5.	$\frac{5}{8}$	$\frac{7}{9}$	$\frac{2}{3}$
6.	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{8}{15}$
7.	$\frac{11}{16}$	$\frac{17}{24}$	$\frac{5}{6}$
8.	$\frac{4}{9}$	$\frac{13}{30}$	$\frac{11}{16}$

Exercise 23

	A	B	C
1.	$\frac{2}{25}$	$\frac{1}{4}$	$\frac{1}{250}$
2.	$\frac{1}{2}$	$\frac{1}{6}$	$\frac{1}{30}$
3.	$\frac{2}{30}$	$\frac{1}{500}$	$\frac{1}{250}$
4.	$\frac{1}{20}$	$\frac{10}{51}$	$\frac{3}{8}$
5.	$\frac{3}{400}$	$\frac{3}{5000}$	$\frac{3}{20}$
6.	$\frac{1}{30}$	$\frac{3}{25}$	$\frac{8}{13}$

Exercise 24

	A	B	C
1	1¼	2½	2 ¾
2	$1\ ^{3}/_{8}$	$1\ ^{1}/_{8}$	$1\ ^{1}/_{16}$

Exercise 25

	A	B	C
1	$9\ \frac{2}{9}$	$6\ \frac{3}{7}$	$9\ \frac{3}{5}$
2	$6\ \frac{3}{5}$	$4\ \frac{7}{8}$	$7\ \frac{7}{9}$
3	$8\ \frac{4}{9}$	$7\ \frac{5}{8}$	$5\ ^{1}/_{6}$
4	$5\ \frac{3}{8}$	$4\ \frac{5}{6}$	$9\ ^{1}/_{3}$

Exercise 26

	A	B	C
1	$\frac{7}{4}$	$\frac{17}{8}$	$\frac{9}{4}$
2	$\frac{19}{8}$	$\frac{5}{2}$	$\frac{23}{8}$

Exercise 27

	A	B	C
1	$\frac{13}{3}$	$\frac{27}{5}$	$\frac{65}{8}$
2	$\frac{46}{5}$	$\frac{17}{2}$	$\frac{35}{8}$
3	$\frac{19}{2}$	$\frac{37}{9}$	$\frac{25}{3}$
4	$\frac{13}{4}$	$\frac{15}{2}$	$\frac{17}{9}$
5	$\frac{22}{3}$	$\frac{25}{8}$	$\frac{43}{8}$
6	$\frac{27}{7}$	$\frac{27}{4}$	$\frac{37}{4}$
7	$\frac{24}{7}$	$\frac{23}{8}$	$\frac{64}{9}$

Exercise 28

	A	B	C
1	$\frac{3}{8}$	$\frac{5}{7}$	$\frac{5}{7}$
2	$\frac{9}{11}$	$\frac{4}{5}$	$\frac{7}{9}$
3	$\frac{4}{7}$	$\frac{7}{10}$	$\frac{2}{3}$

Exercise 29

	A	B	C
1	$\frac{3}{7}$	$\frac{3}{11}$	$\frac{2}{9}$
2	$\frac{1}{9}$	$\frac{4}{11}$	$\frac{2}{5}$
3	$\frac{3}{5}$	$\frac{2}{7}$	$\frac{1}{3}$

Exercise 30

	A	B	C
1	$\frac{3}{4}$	$\frac{3}{8}$	$\frac{5}{16}$
2	1¼	$\frac{7}{8}$	$\frac{7}{8}$
3	$\frac{13}{16}$	$1\,{}^{1}/_{8}$	$1\,{}^{3}/_{8}$
4	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{7}{8}$
5	$\frac{1}{4}$	$\frac{5}{8}$	$\frac{13}{16}$

Exercise 31

	A	B	C
1	$\frac{9}{10}$	$\frac{7}{10}$	$\frac{9}{14}$
2	$\frac{13}{16}$	$\frac{15}{16}$	$\frac{7}{15}$
3	$\frac{5}{8}$	$\frac{19}{21}$	$\frac{1}{2}$
4	$\frac{13}{14}$	$\frac{14}{15}$	$\frac{2}{3}$

Exercise 32

	A	B	C
1	$\frac{1}{8}$	$\frac{7}{16}$	$\frac{3}{10}$
2	$\frac{3}{14}$	$\frac{1}{10}$	$\frac{11}{16}$
3	$\frac{8}{15}$	$\frac{1}{15}$	$\frac{1}{6}$
4	$\frac{1}{21}$	$\frac{5}{14}$	$\frac{1}{3}$

Exercise 33

	A	B	C
1	$\frac{17}{24}$	$\frac{14}{15}$	$\frac{13}{15}$
2	$\frac{20}{21}$	$\frac{17}{21}$	$\frac{23}{24}$
3	$\frac{9}{14}$	$\frac{22}{35}$	$\frac{53}{56}$
4	$\frac{13}{24}$	$\frac{46}{45}$ or $1\frac{1}{45}$	$\frac{19}{20}$
5	$\frac{11}{15}$	$\frac{29}{35}$	$\frac{52}{45}$ or $1\frac{7}{45}$

Exercise 34

	A	B	C
1	$\frac{7}{24}$	$\frac{4}{15}$	$\frac{2}{15}$
2	$\frac{1}{21}$	$\frac{8}{35}$	$\frac{19}{24}$
3	$\frac{5}{14}$	$\frac{2}{15}$	$\frac{19}{56}$
4	$\frac{11}{21}$	$\frac{7}{24}$	$\frac{2}{105}$
5	$\frac{5}{12}$	$\frac{37}{60}$	$\frac{1}{18}$

Exercise 35

	A	B	C
1	6	7	8
2	8	7	6
3	144	185	31
4	62	5	109
5	14	12	20
6	12	18	18
7	90	280	540
8	105	184	561
9	140	136	390

Exercise 36

	A	B	C
1.	$\frac{3}{20}$	$\frac{4}{9}$	$\frac{1}{18}$
2.	$\frac{3}{140}$	$\frac{20}{21}$	$\frac{12}{35}$
3.	$\frac{1}{16}$	$\frac{9}{10}$	$\frac{9}{32}$
4.	$\frac{7}{16}$	$\frac{4}{27}$	$\frac{3}{16}$
5.	$\frac{1}{5}$	$\frac{27}{32}$	$\frac{1}{18}$
6.	$\frac{7}{72}$	$\frac{21}{160}$	$\frac{121}{160}$
7.	$\frac{5}{99}$	$\frac{27}{38}$	$\frac{3}{4}$

Exercise 37

	A	B	C
1	2	$\frac{15}{2}$ or $7\frac{1}{2}$	$\frac{10}{3}$ or $3\frac{1}{3}$
2	$\frac{21}{2}$ or $10\frac{1}{2}$	$\frac{18}{7}$ or $2\frac{4}{7}$	12
3	$\frac{30}{11}$ or $2\frac{8}{11}$	$\frac{112}{5}$ or $22\frac{2}{5}$	$90.00
4	44	3	$420

Exercise 38

	A	B	C
1	$\frac{2}{3}$	$\frac{3}{2}$ or $1\frac{1}{2}$	$\frac{4}{3}$ or $1\frac{1}{3}$
2	4	$\frac{3}{2}$ or $1\frac{1}{2}$	$\frac{1}{2}$
3	$\frac{9}{10}$	$\frac{15}{4}$ or $3\frac{3}{4}$	$\frac{3}{5}$
4	$\frac{2}{3}$	$\frac{6}{5}$ or $1\frac{1}{5}$	$\frac{3}{14}$
5	$\frac{3}{5}$	$\frac{5}{16}$	$\frac{2}{3}$

Exercise 39

	A	B	C
1	$\frac{8}{7}$ or $1\frac{1}{7}$	$\frac{5}{14}$	$\frac{10}{21}$
2	$\frac{3}{14}$	$\frac{8}{7}$ or $1\frac{1}{7}$	$\frac{1}{7}$
3	6	$\frac{7}{4}$ or $1\frac{3}{4}$	$\frac{5}{9}$
4	$\frac{3}{4}$	14	$\frac{1}{45}$
5	$\frac{8}{3}$ or $2\frac{2}{3}$	$\frac{8}{9}$	$\frac{10}{9}$ or $1\frac{1}{9}$
6	$\frac{7}{10}$	$\frac{9}{25}$	$\frac{4}{5}$
7	$\frac{9}{2}$ or $4\frac{1}{2}$	2	$\frac{7}{4}$ or $1\frac{3}{4}$
8	$\frac{12}{7}$ or $1\frac{5}{7}$	$\frac{5}{12}$	$\frac{2}{21}$
9	$\frac{1}{3}$	$\frac{4}{3}$ or $1\frac{1}{3}$	$\frac{3}{2}$ or $1\frac{1}{2}$

Exercise 40

	A	B	C
1	$\frac{1}{10}$	$\frac{1}{5}$	$\frac{3}{10}$
2	$\frac{6}{25}$	$\frac{23}{50}$	$\frac{77}{100}$
3	$\frac{7}{20}$	$\frac{81}{100}$	$\frac{33}{50}$
4	$\frac{3}{5}$	$\frac{7}{10}$	$\frac{4}{5}$
5	$\frac{19}{20}$	$\frac{11}{20}$	$\frac{3}{100}$
6	$\frac{13}{20}$	$\frac{1}{4}$	$\frac{9}{25}$
7	$\frac{1}{8}$	$\frac{7}{8}$	$\frac{3}{8}$
8	$\frac{4}{25}$	$\frac{83}{100}$	$\frac{9}{20}$
9	$\frac{1}{2}$	$\frac{9}{10}$	$\frac{4}{5}$
10	$\frac{3}{4}$	$\frac{13}{50}$	$\frac{39}{100}$
11	$\frac{9}{50}$	$\frac{69}{100}$	$\frac{12}{25}$
12	$\frac{1}{200}$	$\frac{3}{500}$	$\frac{1}{250}$
13	$\frac{17}{20}$	$\frac{23}{25}$	$\frac{57}{100}$
14	$\frac{1}{50}$	$\frac{2}{25}$	$\frac{1}{25}$
15	$\frac{79}{100}$	$\frac{19}{50}$	$\frac{99}{100}$
16	$\frac{3}{250}$	$\frac{1}{40}$	$\frac{3}{40}$

Exercise 41

	A	B	C
1	0.7	0.3	0.9
2	0.17	0.37	0.15
3	0.07	0.01	0.03
4	0.8	0.6	0.4
5	0.25	0.75	0.05
6	0.125	0.15	0.875
7	0.65	0.04	0.28
8	0.025	0.225	0.275
9	0.02	0.06	0.38

Exercise 42

	A	B	C
1	0.33	0.67	0.17
2	0.83	0.44	0.78
3	0.14	0.43	0.86
4	0.09	0.23	0.13

Exercise 43

a) $\frac{5}{17}, \frac{8}{17}, \frac{4}{17}$ b) chocolate $\frac{11}{50}$ chemical sprays $\frac{7}{150}$ stress $\frac{41}{75}$ icecream $\frac{1}{6}$ PMS $\frac{9}{75}$ weather $\frac{1}{30}$

c) $\frac{3}{5}$ 18 chronic, 27 acute d) $\frac{2}{5}$ = 1012 students e) $\frac{1}{4}$

f) $\frac{3}{8}$ g) 20 h) 96 pieces, 13 cakes altogether (ie 5 more)

i) $\frac{1}{7}$ = 0.143 mg j) 510kcal

Exercise 44

	A	B	C
1	0.14	0.52	0.99
2	0.84	0.32	0.45
3	3.5	3.93	5.01
4	0.04	0.02	0.06
5	0.64	0.195	0.1003
6	0.136	0.1645	0.018
7	0.005	0.025	0.0106

Exercise 45

	A	B	C
1	73%	82%	84%
2	7%	97%	87%
3	70%	6%	2%
4	108%	110%	640%
5	310%	50%	10%
6	0.29%	0.4%	69.3%
7	87.5%	2.5%	319%

Exercise 46

	A	B	C
1	$\frac{3}{20}$	$\frac{1}{10}$	$\frac{7}{20}$
2	$\frac{9}{20}$	$\frac{3}{25}$	$\frac{2}{5}$
3	$\frac{1}{25}$	$\frac{1}{50}$	$\frac{3}{100}$
4	$\frac{9}{10}$	$\frac{1}{5}$	$\frac{1}{2}$
5	$\frac{1}{20}$	$\frac{7}{100}$	$\frac{3}{10}$
6	$\frac{1}{1000}$	$\frac{7}{1000}$	$\frac{1}{250}$
7	$\frac{1}{500}$	$\frac{1}{125}$	$\frac{9}{1000}$
8	$\frac{1}{2500}$	$\frac{1}{2000}$	$\frac{3}{5000}$
9	$\frac{1}{200}$	$\frac{1}{10,000}$	$\frac{7}{10,000}$
10	$\frac{3}{500}$	$\frac{1}{5000}$	$\frac{9}{10,000}$
11	$\frac{1}{200}$	$\frac{1}{40}$	$\frac{3}{40}$
12	$\frac{3}{200}$	$\frac{9}{200}$	$\frac{1}{8}$

Exercise 47

	A	B	C
1	50%	25%	75%
2	20%	40%	60%
3	10%	30%	70%
4	5%	45%	55%
5	44%	68%	76%
6	15%	65%	92%
7	80%	85%	52%

Exercise 48

	A	B	C
1	87.5%	62.5%	12.5%
2	2.5%	7.5%	17.5%
3	0.1%	0.3%	0.7%
4	0.6%	0.2%	1.4%
5	0.02%	0.06%	0.11%

Exercise 49

1. $^{1}/_{1000}$ 0.02 13% 0.6 $^{99}/_{100}$
2. 0.08 ¼ 0.4 ½ 75%
3. 1% $^{1}/_{20}$ 15% 0.2 ¾
4. 2% 22% 0.498 ½ $^{9}/_{10}$
5. $^{1/}_{100}$ 5% 0.08 20% 0.9

Exercise 50

a) $15; $7.50; $3; 30c
b) 20cm; 10cm; 4cm; 0.4cm
c) 10c; 5c; 2c; 0.2c
d) 30min; 15min; 6min 0.6mins
e) $2.80; $1.40; 56c; 5.6c
f) 36km; 18km; 7.2km; 0.72km
g) 45m; 22.5m; 9m; 0.9m
h) $1.60; 80c; 32c; 3.2c
i) $21; $10.50; $4.20; 42c
j) $74; $37; $14.80; $1.48

Exercise 51

1. $21.90 2. $65 3. $22.50 4. $50 5. $60 6. $40

Exercise 52

1. a) $24 b) $48 c) $120 d) $60 e) $180 f) $12 g) $2.40 h) $14.40

13. a) $9 b) $87.50 c) $360 d) $135 e) $512 f) $750 g) $27 h) $40.50

14.

Whole Amount	**1%**	**2.5%**	**5%**	**10%**	**25%**	**50%**	**75%**	**80%**
$80	80c	$2	$4	$8	$20	$40	$60	$64
$40	40c	$1	$2	$4	$10	$20	$30	$32
$60	60c	$1.50	$3	$6	$15	$30	$45	$48
$120	$1.20	$3	$6	$12	$30	$60	$90	$96
$240	$2.40	$6	$12	$24	$60	$120	$180	$192
$36	36c	90c	$1.80	$3.60	$9	$18	$27	$28.80
$70	70c	$1.75	$3.50	$7	$17.50	$35	$52.50	$56

Exercise 53

	A	B	C
1	34	50	36
2	9	21	35
3	64	20	7
4	63	22	13
5	30	19	42
6	0.5	1.4	1.7
7	2.7	0.8	2.8

Exercise 54

1. $112.50 2. 6572 students 3. $350 4. 310,500
5. $36.80

Exercise 55

1. 50% 2) 25% 3. 15% 4. 25% 5. 10% 6. 10%

7. a) 40% (b) 70% (c) 90% (d) 62½% or 62.5%

8. 20% 9. 10% 10. 75% 11. 12.5% 12. 12.33%

Exercise 56

1. 150mL 2. 5%
3. 30% 35% 7% 8% 20%
4. 0.5% 5. $\frac{1}{6}$ = 16.7%

Exercise 57

(1)	0.5	(2)	0.65	(3)	0.04	(4)	0.087
(5)	0.6325	(6)	0.834	(7)	0.065	(8)	0.3225
(9)	0.5806	(10)	1.6	(11)	3.3	(12)	0.0373

Exercise 58

(1)	$\frac{1}{2}$	(2)	$\frac{3}{4}$	(3)	$\frac{11}{20}$	(4)	$\frac{6}{25}$
(5)	$\frac{37}{100}$	(6)	$\frac{1}{8}$	(7)	$\frac{9}{40}$	(8)	$\frac{63}{100}$
(9)	$^2/_{15}$	(10)	$1\frac{1}{5}$ or $\frac{6}{5}$	(11)	$1\frac{7}{10}$ or $\frac{17}{10}$	(12)	$2\frac{1}{2}$ or $\frac{5}{2}$

Exercise 59

(1)	25%	(2)	10%	(3)	60%	(4)	12½% or 12.5%
(5)	35%	(6)	150%	(7)	14%		
(8)	39%	(9)	350%	(10)	105%	(11)	22½% or 22.5%

Exercise 60

(1)	70%	(2)	45%	(3)	53%	(4)	72.5%(8)
(5)	390%	(6)	83.7%	(7)	175%	7%(12)	7.25%
(9)	0.8%	(10)	110.4%	(11)	970%		

(13) Sodium Monofluorophosphate $\frac{71}{10,000}$ 0.0071

Calcium Glycerophosphate $\frac{13}{10,000}$ 0.0013

Sodium Fluoride $\frac{7}{50,000}$ 0.00014

Exercise 61

1. (a) ½ (d) $^{9}/_{20}$
   (b) ¾ (e) $^{9}/_{100}$
   (c) $^{7}/_{9}$ (f) $^{2}/_{5}$

2. (a) 4 (b) 1 ½ (c) 6

3. (a) $^{4}/_{3}$ (b) $^{52}/_{5}$ (c) $^{17}/_{4}$

4. (a) 0.45 (b) 0.68 (c) 0.77
   (d) 0.17 (e) 0.43

5. (a) $^{7}/_{72}$ (b) $^{11}/_{36}$ (c) $^{5}/_{6}$

6. (a) 5 (b) 140 (c) 135

7. (a) $^{1}/_{5}$ (b) $^{2}/_{5}$ (c) $^{1}/_{8}$
   (d) $^{37}/_{100}$ (e) $3\ ^{3}/_{100}$ (f) $^{11}/_{200}$

Exercise 62

1. (a) 25% (b) 162.5% (c) 2437%

2. (a) 0.35 (b) 0.06 (c) 0.75

3. (a) 25% (b) 20% (c) 5%

(d) 28% (e) 65% (f) 1%

4. (a) $^{3}/_{10}$ (b) $1\ ^{1}/_{2}$ (c) $^{43}/_{100}$
(d) $^{7}/_{1000}$ (e) $^{3}/_{10000}$ (f) $^{1}/_{2000}$
(g) $^{1}/_{200}$ (h) $^{7}/_{200}$ (i) $^{7}/_{40}$

5.

Percentage	50	25	78	5	2	1250	80	4	48	30	9
Equivalent Fraction	$^{1}/_{2}$	$^{1}/_{4}$	$^{39}/_{50}$	$^{1}/_{20}$	$^{1}/_{50}$	$^{25}/_{2}$	$^{4}/_{5}$	$^{1}/_{25}$	$^{12}/_{25}$	$^{3}/_{10}$	$^{9}/_{100}$
Decimal Fraction	0.5	0.25	0.78	0.05	0.02	12.5	0.8	0.04	0.48	0.3	0.09

6. (a) 8 (b) 6 (c) 15

Nursing for Maths Glossary

Fill in the mathematical meaning of these words as you encounter them in the course.

Visit http://www.math-only-math.com/online-math-dictionary.html for an on-line dictionary of maths words.

Centi-	
Conversions	
Estimation	
Equivalent Fraction	
Fraction	
Gram	
Improper fraction	
Kilo-	
Litre	
Measurement	
Metre	
Metric System	
Metric Units	
Micro-	
Milli-	
Mixed number	
Nano-	
Percentage	

Scales	
Simplify	