

Level 1

Functional Skills

Problem Solving

Workbook



Name: _____

Discounts Involving Fractions

Calculate the fraction of an amount as normal but take away from the original price.

e.g. Bed cost £900 but is reduced by a third in a sale.

$$900 \div 3 = 300$$

$$900 - 300 = £600$$

New cost after discount £600

Question 1

A tin of baked beans costs 68p. How much would the same tin cost if it was half price?

Question 2

Orla's car insurance would normally cost her £570. If she buys it online she gets one third off. How much will her car insurance cost with this discount?

Question 3

Tim is booking a hotel room. The room he wants cost £120 per night. He finds a web site offering the same room for three quarters of the price. How much does the room cost on this website?

Calculating Percentages

Example

What is 20% of £60

$$20 \div 100 \times 60$$

$$= £12$$

Question 1

- Kim teaches a yoga class. The class has twenty members. 80% of the class are women. How many of the class are women?

Question 2

- A dress costs £35. How much could be saved with a voucher for 10% off?

Question 3

- There are 30 sweets in a bag of haribos, 25% of them are fried eggs, how many fried eggs are there in the bag?

Calculating percentage increase and decrease

Example

Paula buys a coat in a sale. The coat cost £120 but there is a 30% discount. How much is the new price of the coat?

$$30 \div 100 \times £120 = £36$$

$$£120 - £36 = £84$$

New price of coat is £84

Question 1 After

- Steve is buying a car. It would normally cost £3200, but today there is 20% off. What is the new price of the car

Question 2

- Maureen is measuring out material. She measures out 2.5 meters. The shop owner gives her another 10% for free. How much material does Maureen end up with?

Question 3

- David borrows £5000 to start up a business. He pays back the loan in 1 year plus 9% interest. How much does he pay back in total?

Ratio and sharing in a ratio

Example

5 pints of milk cost £2.00. How much will 3 pints cost?

- Find out how much 1 pint costs

5 pints cost £2 so cost of 1 pint is $2 \div 5 = 0.4$

- To find out cost of 3 pints times your answer by 3

$$0.4 \times 3 = \text{£}1.20$$

Questions

- 1) 6 pens cost £1.80, how much will 7 pens cost?
- 2) 5 books cost £3.50, how much will 4 books cost?
- 3) 5 gallons of diesel cost £10.50, how much do 8 gallons cost?
- 4) 500grams of butter cost £2.50, how much would 2 kgs cost

Sharing in a ratio example.

A drink is made from 1 part cordial and 3 parts water, 800ml of the drink is made, how much cordial is used?

- First work out how many parts there are in total, to do this add up the numbers in the ration

$$1 + 3 = 4 \text{ parts}$$

- The drink contains 1 part cordial, to work out how many ml are in 1 part, divide the total amount by the number of parts

$$800 \div 4 = 200\text{ml}$$

Question 1

£3000 will be split between two people in the ratio 2:1, how much does each person get?

Question 2

Paul and Mike share £600 in the ration 5:1, how much does Paul get?

Question 3

Helen is making an orange drink, she mixes 4 parts water to 1 part squash. She wants to make 1 litre (1000ml) of orange juice. How much squash does she need?

Best Buys

Example.

Quality street £5 per tin

Special offer Buy 3 get 4th free. How much would 12 cost?

£5	£5	£5	Free
£5	£5	£5	Free
£5	£5	£5	Free

You would pay for 9 boxes $9 \times 5 = \text{£}45$

Question 1

- Coal cost £8 per bag. Buy 4 get 1 free, how much would 20 bags cost?

Question 2

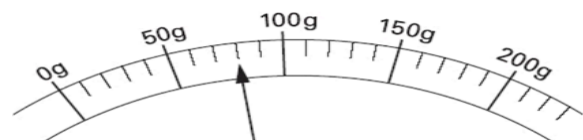
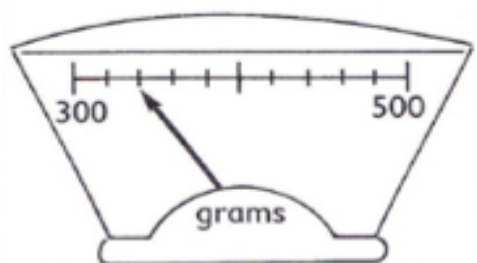
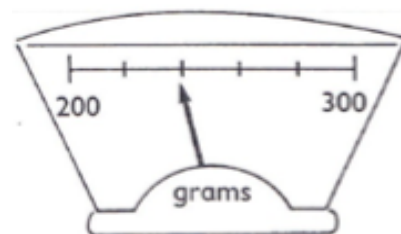
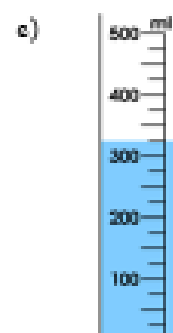
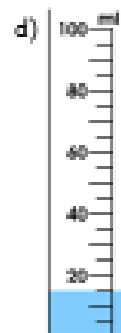
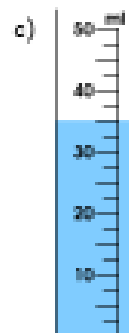
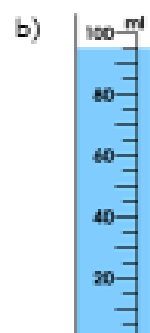
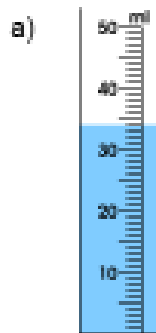
- Coffee cost £3 per pack, buy 3 get 1 free. How much would 16 packs cost?

Question 3

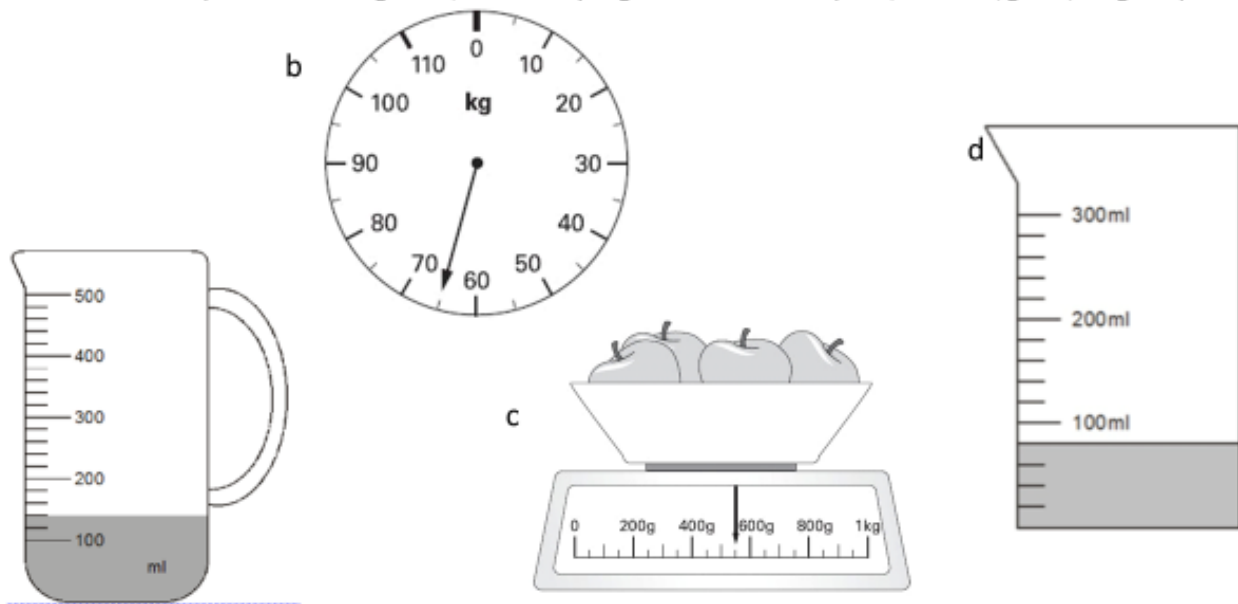
- A customer needs 750kg of gravel for his garden. It comes in 50kg bags. Each bag costs £8, however if he buys 4, he gets 1 free. How much does he pay?

Reading scales

1. State the *capacity* shown in *ml*, for each of the following:

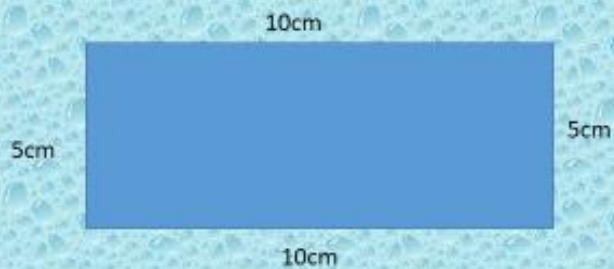


Read and interpret the following scales, make sure you give the correct unit (litres/millilitres/grams/kilograms):



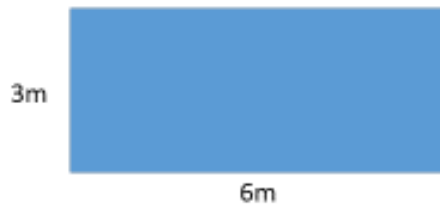
Perimeter of a Shape

- The perimeter is the distance around the outside of the shape.
- To find a perimeter, you add up the lengths of all the sides.



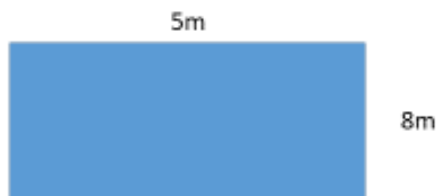
- Perimeter = $5 + 5 + 10 + 10 = 30\text{cm}$

Question 1



Sean wants to put a border around the wall. How many meters of material will he need?

Question 2



Sean wants to put a border around his room as he loves borders. How much would it cost if 1 metre of border costs £4

Area

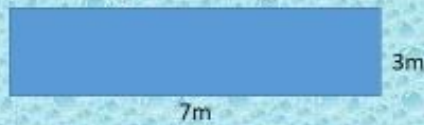
- Sophie is buying a new carpet for her dining room. The room is 6m long and 5m wide. What area of carpet does she need to buy?



- Area = $5 \times 6 = 30\text{m}^2$

Area in calculations

- Thomas is painting two walls, shown below. One wall is 7m long and 3m high, the other is 6.5m long and 2m high.



- Each tin of paint will cover 12m^2
 - How many tins of paint does he need to buy?
- Work out the area of each wall ($7 \times 3 = 21\text{m}^2$ and $6.5 \times 2 = 13\text{m}^2$)
- Then add them together $= 21 + 13 = 34\text{m}^2$
- Now work out how many tins of paint Thomas needs to cover this area.
- To do this divide the total area of the walls by the area that one tin will cover
 - $34\text{m}^2 \div 12\text{m}^2 = 2.8$
 - Thomas can't buy 2.8 tins of paint, so he'll have to buy **3 tins**

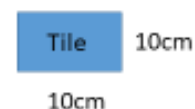
Question 1

- A church is raising money to put gravel on their car park and path. It will cost £4.20 for each m^2 that needs gravel. How much money does the church need to raise?



Question 2

- Emma is tiling a section of her bathroom. The tiles are 10cm by 10cm. This section of wall she wants to tile is 120cm across and 80cm high.



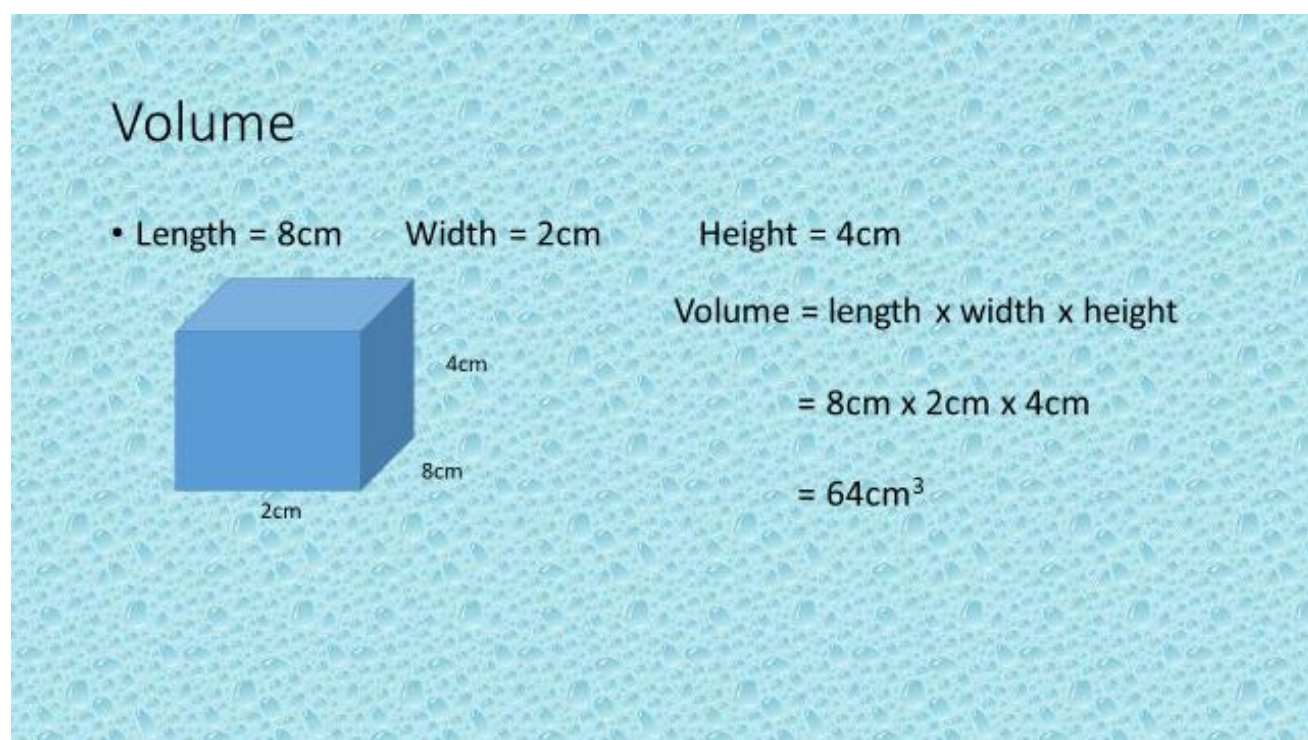
- How many tiles will Emma need?

Question 3

- Mollie is tiling her bathroom wall. The wall is 6m x 3m. Each square tile is 50cm by 50cm, each tile costs £4.

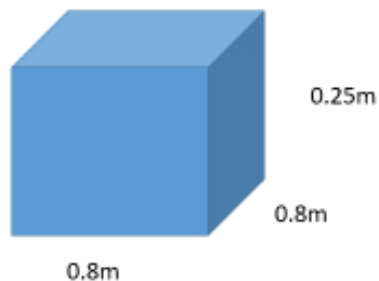


- Calculate the cost of tiling the wall?



Question 1

Sarah has bought a sand pit for her daughter. The sand pit is 0.8m long, 0.8m wide and 0.25m high. What volume of sand can it hold



Value for money calculations

If you are buying a pack of something, you can work out how much you're paying for each item.

Price per item = total price $\div$ number of items

You can then compare the price per item for that pack with other packs

Example

A shop sells tins of beans in packs of 4 or 6. the 4-pack costs £1.80. The 6-pack costs £2.40

4-pack: Price per tin = $\text{£}1.80 \div 4 = \text{£}0.45$

6-pack: price per tin = $\text{£}2.40 \div 6 = \text{£}0.40$

The 6-pack costs less per tin, so its better value than the 4-pack

Question 1

A multipack of crisps costs £1.20. it has 6 packs in it. Another multipack costs £2.30 and has 10 packs in it. Which multipack is the best value for money?

Question 2

A 50g box of sweets costs £6.30. A 30g box costs £39. Which is the better value?

Question 3

Toilet rolls come in packs of 4 and 9. The 4-pack costs £1.89 and the 9-pack costs £3.99 , which pack is better value?

Time and Timetables



For revision try this BBC Bitesize page



Test bite covering all aspects of time

When adding up time it can be useful to add up the total hours first and then add on your minutes.

Example:

It is 12:35 when you arrive at work. You leave at 5:13 how long have you been at work.

12:35 to 1 = 25 minutes

1 to 5 = 4 hours

5 to 5:13 = 13 minutes

Total time = 4 hours and 38 minutes

1. Here is part of a timetable for a bus.

Southville	09 18	10 38	12 05
Leek	09 28	10 48	-----
Milton	09 41	11 01	-----
Newtown	09 49	11 09	-----
Red Island	09 55	11 15	12 36
Sandville	10 13	11 33	-----
Bakerstown	10 31	11 51	13 00

A bus leaves Southville at 10 38

- (a) At what time should the bus arrive at Newtown?

.....
(1)

- (b) How long will the journey take?

.....minutes
(1)

James arrives at the Milton bus stop at 09 29.

- (c) (i) How many minutes should he wait?

.....minutes
(1)

- (ii) At what time should James arrive at Red Island?

.....
(1)

Sally wants to travel from Southville to Bakerstown.
The 12 05 is an 'express' bus.

- (d) How many minutes shorter is the journey if she takes the 'express bus'?

.....minutes
(2)

Lenny lives in Jamestown and works in Lincoln.
He works Monday to Friday.
Lenny travels to work and back each day by train.

- (c) How long does Lenny spend on the train each week?
Give your answer in hours and minutes.

.....hours.....minutes
(3)

2. Here is part of a train timetable.

Southville	07 04
Leek	07 09
Jamestown	07 38
Lincoln	08 01
Gold City	08 39

(a) How long is the journey from Southville to Jamestown?

.....minutes
(1)

(b) How long is the journey from Leek to Lincoln?

.....minutes
(1)

The train leaves Gold City at 08 45.
It takes 33 minutes to travel to Washington.

(c) At what time does the train arrive in Washington?

.....
(1)

	Departure times			
Antrim	12:30	13:00	14:00	16:00
Randalstown	12:45	13:15	14:15	16:15
Ballymena	13:01	13:31	14:31	16:31
Ballycastle	13:39	14:09	15:09	17:09

Freddy wants to travel from Randalstown to Ballycastle.
He arrives at Randalstown at 13:03 to catch the next train to Ballycastle.

(a) How long does this train journey take?

.....minutes
(2)

Jennifer lives in Antrim and her friend lives in Ballymena.

Jennifer lives a 5 minute walk from Antrim train station.
Her friend lives a 30 minute walk from Ballymena train station.

Jennifer wants to arrive at her friend's house **before** 3pm.

Plan Jennifer's journey to her friend's house.

4. The timetable shows the times of trains from Southville to Milton.

Southville	0630	0650	0720	0745
Leek	0703	0715	0751	0810
Milton	0824	0835	0920	0940

- (a) Georgie arrives at the station at Southville at 0658 and gets the next train to Leek.

What time does this train leave Southville?

.....
(1)

- (b) The 0745 train from Southville arrives in Milton 11 minutes early.

What time does this train arrive in Milton?

.....
(1)

5. This timetable shows the times (GMT) of trains between London and Paris.

London	04 21	05 19	06 39	07 59
Paris	07 11	08 09	09 29	10 49
Paris	14 40	15 28	17 00	18 49
London	17 30	18 18	19 50	21 39

- (a) At what time does the 05:19 from London arrive in Paris?

.....
(1)

- (b) How long does each journey take?

.....hours.....minutes
(1)

- (c) Tom arrives in Paris at 09:29.

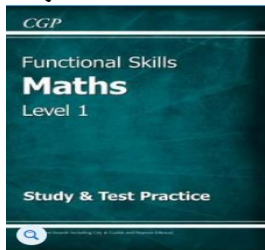
He spends the next 7 hours visiting tourist attractions in Paris.

What is the time of the next train he can catch back to London?

Real life word Problems with rounding, look out for the exceptions to the usual rules

1. The college has £100 to spend on new maths text books. How many books can the college afford to buy?

**** (This is the book you should buy for the course) ****



£6.86 + FREE delivery
RRP £7.50 You save £0.64 (8%)
★★★★★

2. Miss Harrison's family eat 8 Weetabix per day. How long will the box last?



3. How many 5-a-side football teams can you make from 31 children?
4. 50 people are going to a meeting. We need chocolate brownies for everyone. How many packs do we need to buy?



5. 3 people don't turn up to the meeting. How many packets of brownies did we need to open in the end?
6. The minibus seats 14 people. 60 people want to go to the cricket tournament. How many times must the bus make the trip?

Problem solving

1. Express 30 out of 40 and 40 out of 50 as a percentage. Which is the better score?
2. Robyn and Rachel bought a set of CDs for £20. Robyn paid £11 and Rachel £9. What percentage of the total cost did each pay?

3. David earns £400 per week and saves £30 towards the cost of a new car. What percentage of his earnings does he save?

4. The price of a small bar of chocolate is 25p and includes 5p profit. Express the profit as a percentage of the price.

5. James needs another 40 stamps to complete his collection. There is a total of 500 stamps in the collection. What percentage of the collection does he already have?

6. In a closing-down sale a shop offers 50% off the original prices.

What fraction is taken off the prices?

7. In a survey one in five people said they preferred a particular brand of cola.



What is this figure as a percentage?

8. Jamila is working out a problem involving $\frac{1}{4}$. How would she enter this into a calculator.

9. Kyle pays tax at the rate of 25% of his income. What fraction of Kyle's income is this?

10. When Rani was buying her flat she had to put down a deposit of $\frac{1}{10}$ of the value of the flat.

What percentage was this?

11. I bought my coat in the January sales with $\frac{1}{3}$ off the original price.



Comparing fractions and percentages with money

1. Amy wants to book a cheap holiday to Italy for next summer. Budget Holidays Ltd offers her a 20% discount for an early booking.

Cheap Treks and Co will reduce the price for the same holiday by a quarter.

Which firm is cheaper?

2. Beth and Ankit buy a chocolate bar to share. Beth has a quarter of the bar and Ankit has a half. What percentage is left?

Metric measures word problems

****Reminder convert to the same unit first****

John rode 2 kilometres on his bike. His sister Sally rode 3000 meters on her bike. Who rode the farthest and how much farther did they ride (answer in km)?

Jessica is measuring two line segments. The first line segment is 30 cm long. The second line segment is 500 mm long. How long are the two line segments together? (answer in cm)

Lois wants to send a box of oranges to a friend by mail. The box of oranges cannot exceed a mass of 10 kg. If each orange has a mass of 200g, what is the maximum number she can send?

Walt grew 10 centimetres in 1 year. He is now 1.6 m tall. How tall was he 1 year ago?

Mary buys a reel of thread for sewing. There are 10 m of thread on the reel. She uses 210 cm. How much is left on the reel in centimeters?

Peter is overweight. He is 105 kg. His aim is to lose 500 g per week. If he manages this, how many weeks will it be until he is 90 kg?

Chase measured a line for his art project. It is 200 millimetres long. How many centimetres is the line?

Cheryl is moving to a new house. Her old house is 3 kilometres from her new house. How many meters is the old house from the new house?

Carlos has a 1.2 meter long piece of wood. He wants to cut it into 3 equal lengths. How long should each piece be in millimetres?

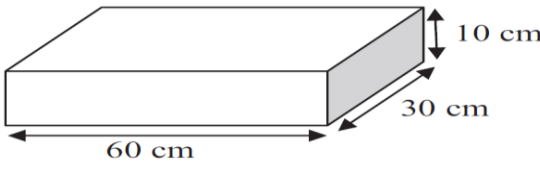
Jessica's shoebox is 20 centimetres long and 10 centimetres wide. How many more millimetres is the length of the shoebox than the width?

A box contains 4 bags of sugar. The total mass of all 4 bags is 6 kg. What is the mass of each bag in grams?

Steven goes to the grocery store and is looking at a winter squash. It has a mass of 1.8 kilograms. How many grams is the winter squash?

A peach weighs 65 grams. If you buy 10 peaches and they sell for £5.50 per kilogram, how much will they cost?

Large box



10 cm
30 cm
60 cm

Match box

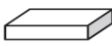


Diagram **NOT** accurately drawn

The diagram shows a large box in the shape of a cuboid and a matchbox.

The large box is full of match boxes.
Each match box is in the shape of a cuboid.
Each match box is 6 cm by 3 cm by 1 cm.

Work out the number of match boxes in the large box.

PROBLEM 1: DIVING BOARD

.....
(3)

The 10 metre diving board has the following dimensions:

240cm long, 50cm wide, 30cm high.

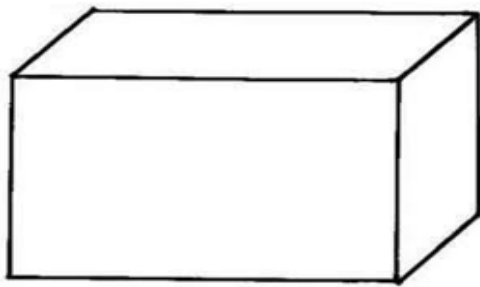
What's the volume of the diving board?



Hint: Convert the measurements for the diving board in problem 1 into m. Then figure out how

PROBLEM 2: LOADING THE LORRY!

- The company Brookforge deliver diving boards in a lorry. The lorry
- has the following dimensions:
- Length = 8m, Width = 3m, Height = 4m
- What's the maximum number of diving boards that can be packed into the lorry?



Lorry

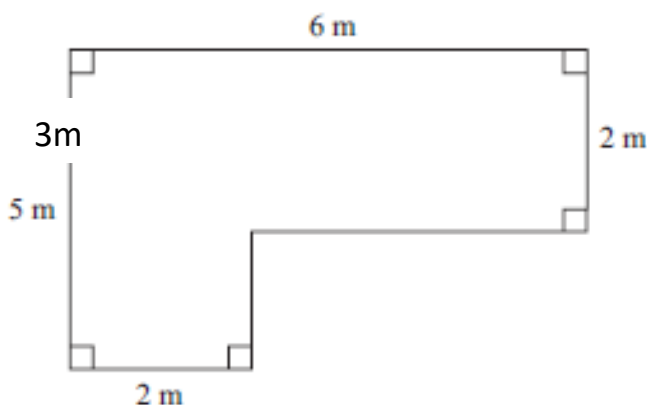


Diving Board



many fit along the length, width and height.

The diagram shows the plan of Mr Eastman's living room



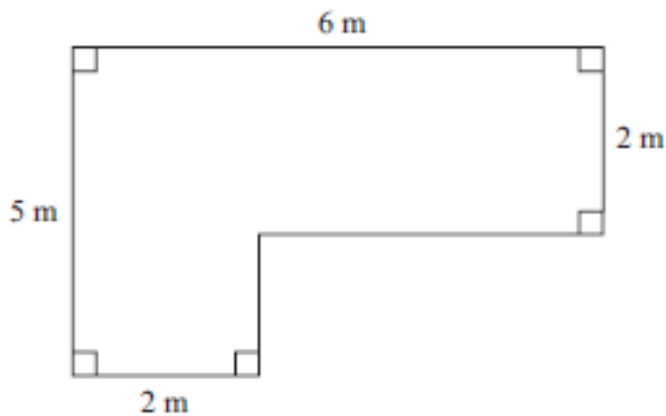
Mr Eastmond wants to cover his floor with carpet. The carpet costs £5 per m^2 .

Calculate the total cost of carpet

£.....

(4 marks)

2. The diagram shows the plan of Mrs Phillips' living room



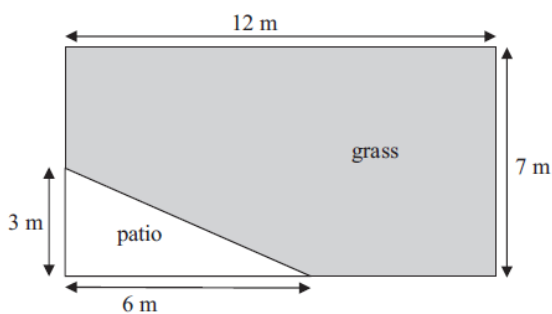
Mrs Phillips is going to cover the floor with floor boards.
One pack of floor boards will cover 2.5m^2 .

How many packs of floor boards does she need?

You must show your working.

.....
(4 marks)

3. Mrs Kunal's garden is in the shape of a rectangle.
Part of the garden is a patio in the shape of a triangle.
The rest of the garden is grass.



Mrs Kunal wants to spread fertiliser over all her grass.

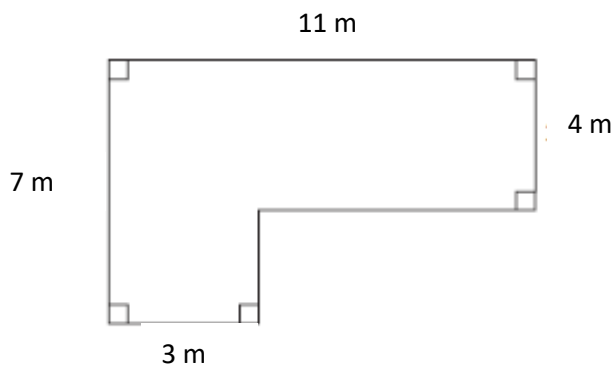
One box of fertiliser is enough for 32m^2 of grass.

How many boxes of fertiliser will she need?

You must show your working.

.....
(4 marks)

4. The diagram shows the plan for a swimming pool.



Mark wants to tile the base of the pool.

One pack of tiles normally costs £24

One pack of tiles covers 6m^2 .

There is a discount of 25% off the packs of tiles.

Mark has £150, does he have enough money to tile the pool?

Example – Volume

.....

(5 marks)

Area and Perimeter problems

1. Farmer Dom's sheep are escaping out of his field, he needs to put a fence around it.

- a. The length of the field is 140cm, the width is 280cm. How much wooden fencing does farmer Dom need to purchase to go around his field.
- b. Farmer Dom notices that there is very little grass on his field, so he decides to resurface it with new grass. What is the area in m?
- c. The grass comes in strips of 60cm long and 40cm wide. How many strips does farmer Dom need to purchase in order to cover his field sufficiently.

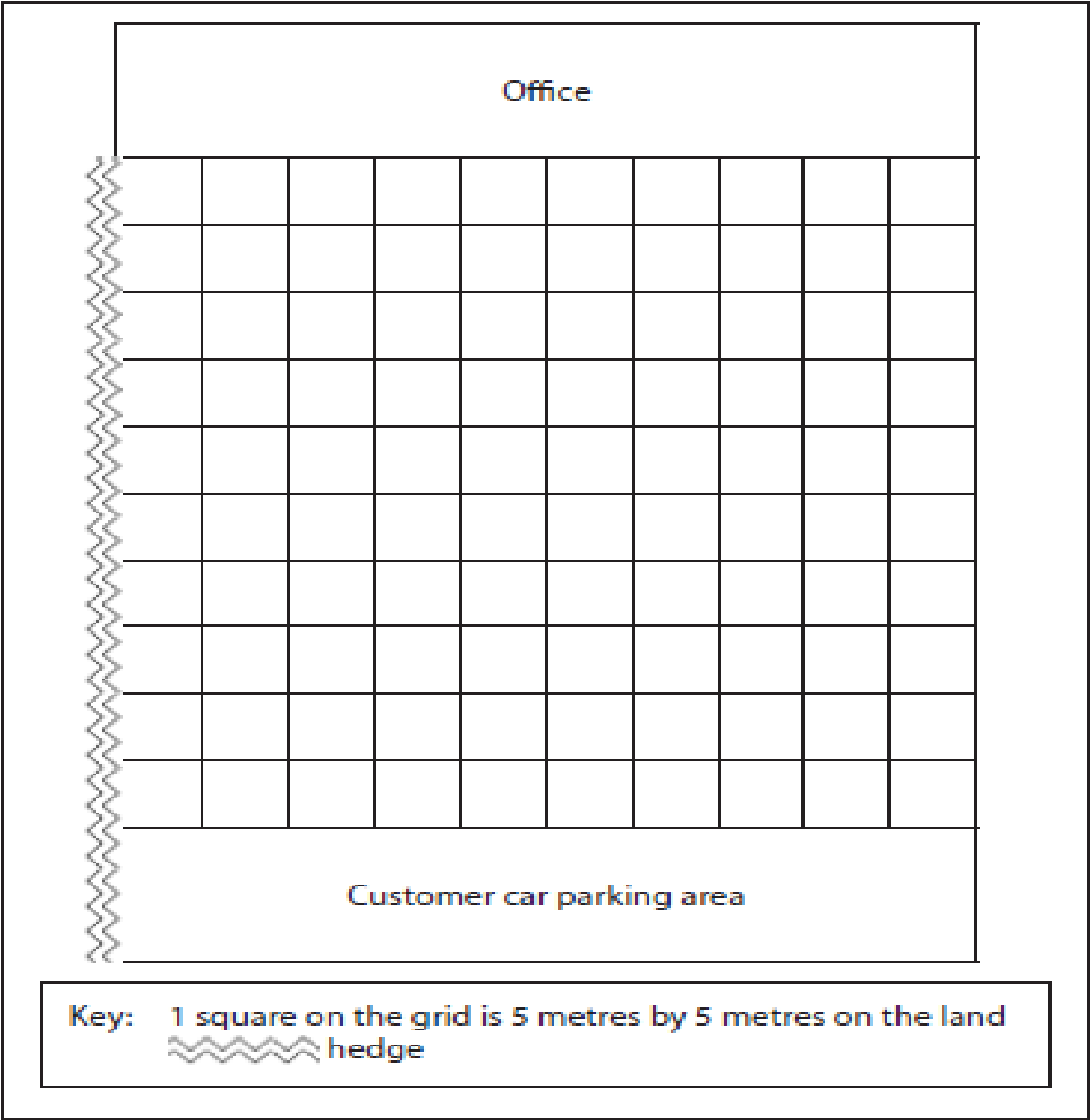
2. Amardeep and Rajvi have just bought a new house, they would like to carpet two rooms in their house.

- a. In their bedroom they would like a navy blue carpet, the length of the room is 11 metres and the width is 7 metres. What area of carpet do Amardeep and Rajvi need to purchase from the 'Amazing Carpet Store' to fit into their bedroom?
- b. Amardeep and Rajvi also want to carpet their sitting room but when they get to the 'Amazing Carpet Store' they have forgotten the length and width of the room. They remember that the area of the sitting room is 32m^2 and the room is not square, what is the length and width of Amardeep and Rajvi's sitting room?
- c. Amardeep and Rajvi also need to purchase some skirting board for their bedroom from 'Wood Warehouse'. What is the total length of skirting board that they need to purchase?

3. David is doing a display on a notice board for all his work colleagues at 'Computer World'.

- a. The first thing David needs to do is cover the notice board with light red paper. He knows that the length is 4.5m and the width is 1.2m. What is the total area of the notice board that David needs to cover with light red paper?
- b. David now needs to put a border around his notice board, he decides that blue would go well with red. What is the total length of blue border that David needs to go around his notice board?
- c. David's boss decides that half the length of the notice board will be used for Sarah's display. Sarah decides just to put a green strip of paper to separate her display from David's display. Using centimetres work how much green border paper Sarah needs?

John wants to decide where to display the cars at the new branch.



Mike wants to put a playhouse and a trampoline in his garden.

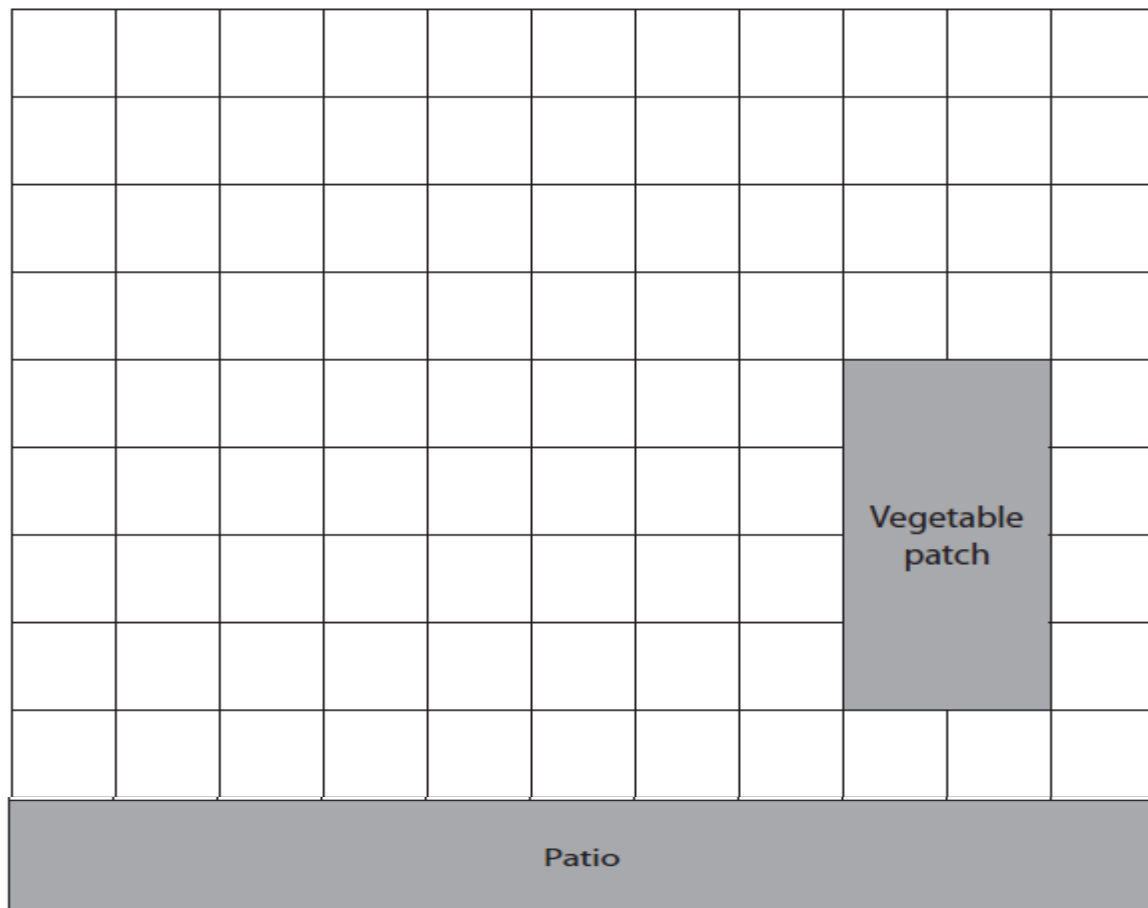
The space for the playhouse needs

- to be rectangular 4 m by 3 m
- to be in a corner.

The space for the trampoline needs

- to be square with sides 3 m
- to have a clear space around it of at least 2 m on all sides.

Mike draws a plan of the garden on a grid.



Key: 1 square on the grid is 1 m by 1 m in the garden

(a) Draw the space for the playhouse and the space for the trampoline on the grid.

(4)

Tamera wants to put a new bath in her bathroom.

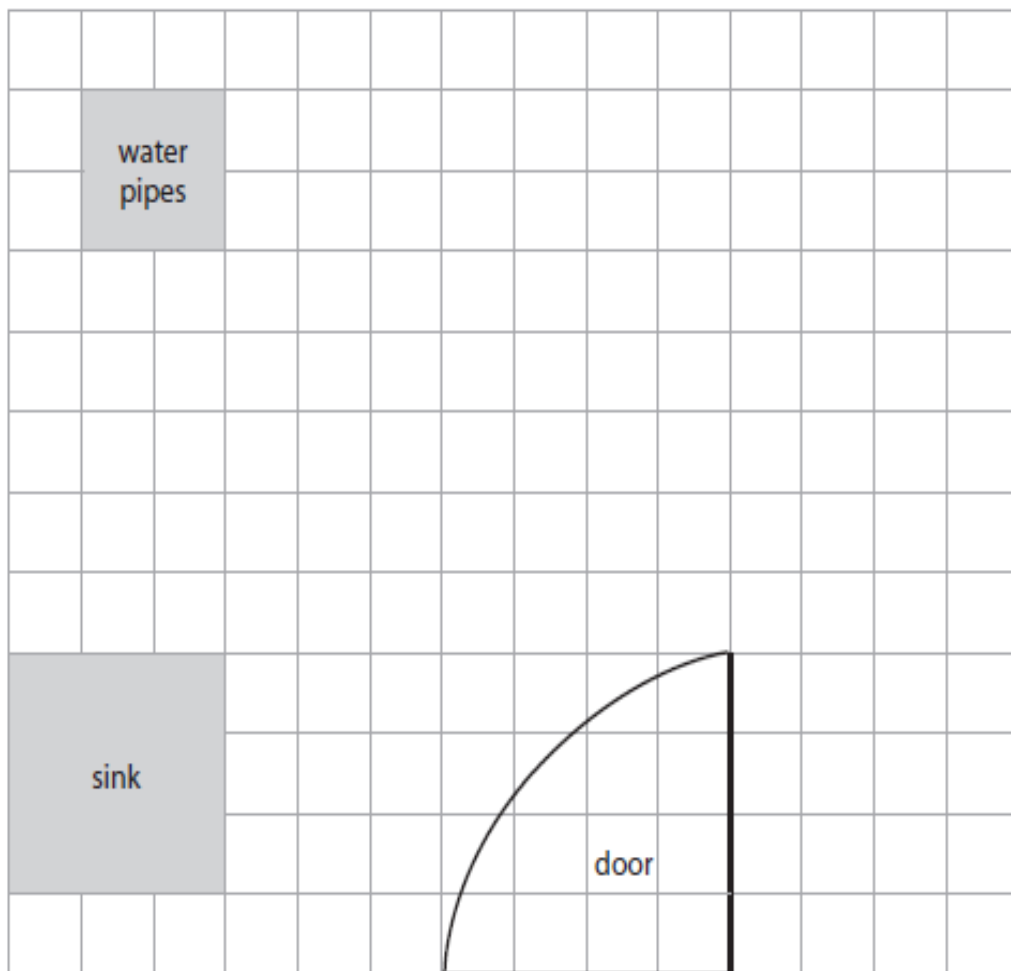
The bath needs a rectangular space 1625 mm by 750 mm

- over the water pipes
- at least 50 cm from the sink
- at least 100 cm from the door.

Tamera draws a plan of her bathroom.

- (a) Draw the space for the new bath on the plan.
Remember to use the key.

(3)



Key: 1 square on the plan is 25 cm by 25 cm in the bathroom

1. A map scale is 1:1500
If the distance on the map is 500cm, what is the actual distance?



A-B measures 16cm and the scale is 4:4000.
What is the total length in metres?

3. A man walks 1500 metres.
On a map this is shown as 3cm.
What is the scale on the map?

4. The following distances were recorded for a sponsored walk:

NAME	DISTANCE	TIME hrs
J Knowes	2200m	2.5
P Lokin	1600m	2.1
R Fotergill	1400m	2.3
P Willid	2900m	2.5
N Moilk	2400m	2.6

What is the total distance walked in kilometres?

Starting City	Destination City	Distance on map (cm)	Distance in real life (Km)
London	Rome	6.9	1345.5
Rome	Madrid		
Moscow	Ireland		
Belarus	Reykjavik		
Stockholm	Use Map to complete the table. The first one has been done for you		



Charity fundrasing

The school are organising a funrasisign event. 3 classes from year 2 took part.

Here is the information for the classes:

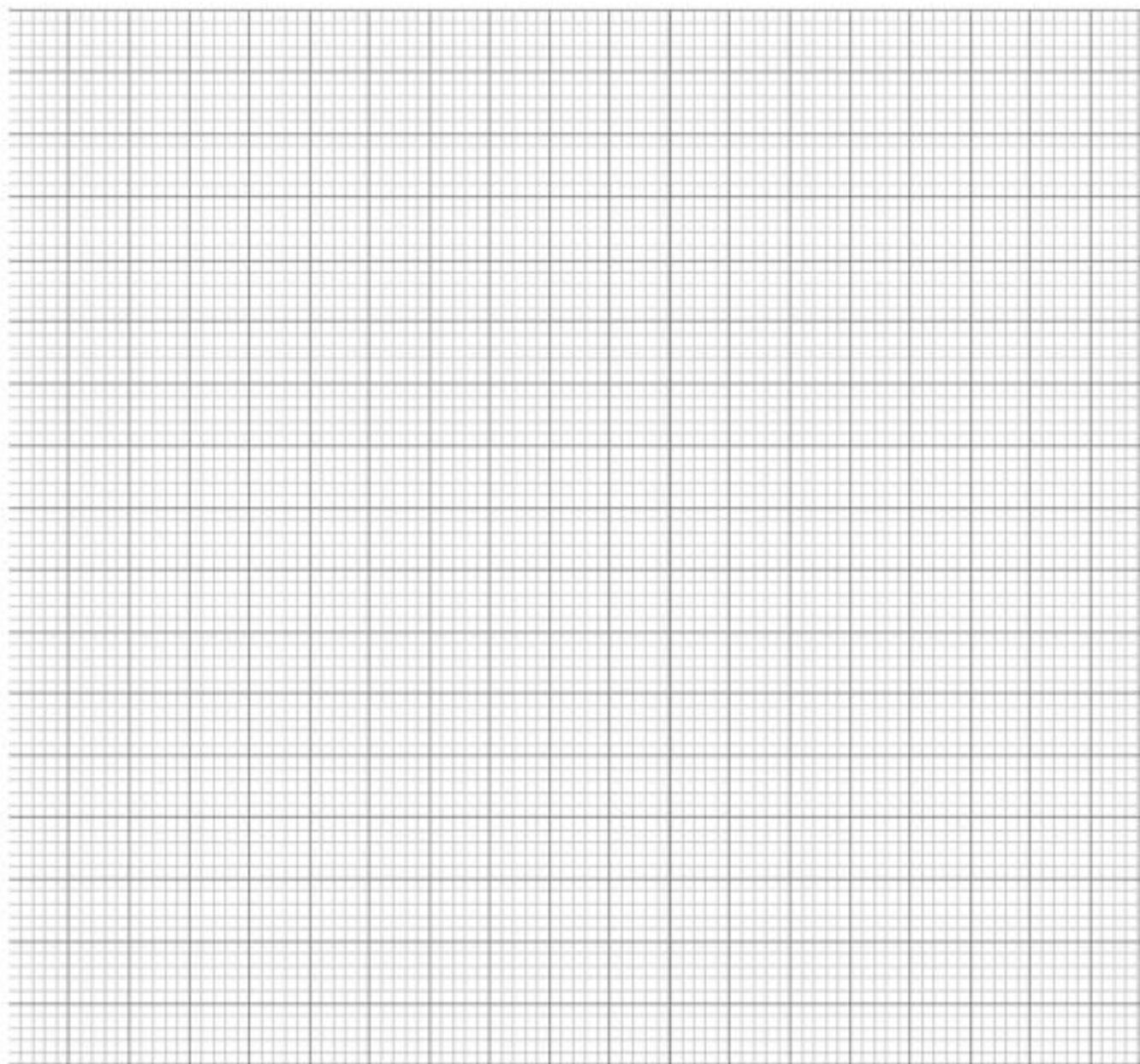
Mr Hogarth's class	
Name	Money raised
Richie	£150
Paul	£180
Marie	£210
Rachel	£175
Mehnaz	£220

Miss Elliot's class	
Name	Money raised
Sarah	£127
Mickey	£100
Paul	£120
Martin	£150
Katy	£300

Mr Smith's Class
3 children raised £200 each

Work out the mean and range of amount raised for each class.

Draw a chart to show the average amounts raised per class



Reverse Calculations

The end of each section will have a question that looks like this:

Choose one for your calculations to show a check.

Check it by a different method than you used originally.

(2 marks)

You need to do a reverse calculation, also called inverse operations, which sounds much more complicated than it is. Try watching the video below for an explanation.

Basically, *Inverses are just Opposites.*

Inverse operations are useful because they reverse the effect of whatever operation you used and get you back to where you started.

The inverse operation of addition is subtraction. The inverse operation of subtraction is addition.

The inverse operation of multiplication is division. The inverse operation of division is multiplication.

For example, if we performed the addition $5 + 4 = 9$, we could undo the addition by using the inverse, subtraction, $9 - 4$ and get back to 5.

or if we performed the multiplication $8 \times 7 = 56$, we could undo the multiplication by using the inverse, division, $56 \div 7$ and get back to 8.

Inverse operations are used to check that calculations are correct. Let's say that we divided 425 by 5 and got the answer 85. We could check this by using the inverse of division which is multiplication by multiplying 85×5 . If the answer is 425, we know that our original calculation was correct.

Remember when you are asked to check one of your calculations it is only 1 sum you to check.