1)

Here is a list of eight numbers

4 5 4 25 29 30 33 39 40

From the list, write down

(i) a factor of 20 ..4, 5.....

(ii) a multiple of 10 ..30, 40.....

(iii) the prime number that is greater than 15 ..29.....

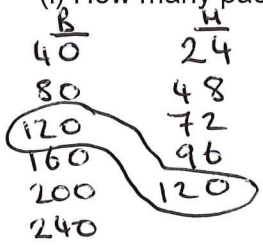
2)

Veena bought some food for a barbecue. She is going to make some hot dogs.
She needs a bread roll and a sausage for each hot dog.

There are 40 bread rolls in a pack. There are 24 sausages in a pack.

Veena bought exactly the same number of bread rolls and sausages.

(i) How many packs of bread rolls and packs of sausages did she buy?



3 ..... packs of bread rolls

5 ..... packs of sausages.

(ii) How many hot dogs can she make?

120

.....

3)

O = PRIME

Here is a list of numbers.

1 (2) 4 (5) (7) (11) (13) 14 15 (17)

From the list, write down **three different** prime numbers that add together to make 20

13 + 5 + 2 = 20

.....

4)(a) Write down the value of $\sqrt{49}$ ..7.....

(b) Write down the cube of 3 ..3x3x3 = 27.....

5)

(a) Write down the value of $\sqrt{81}$ ..9.....

(b) Work out the value of $5^2 + 2^3$ 25 + 8 = 33

6)

(a) Write down the value of 7^2 7x7 = 49

(b) Write down the value of $\sqrt{25}$ 5

(c) Write down the value of 2^3 2x2x2 = 8

problems with all four operations

1) Mrs Orange decides to share her savings between her six grandchildren. She has £350 in her savings tin and £1450 in her savings account. How much will each of her grandchildren get?

350 + 1450 = 1800

1800 ÷ 6 = £300

2) Green lollipops come in packs of 5, yellow lollipops come in packs of 6 and blue lollipops come in packs of 4. A school buys 32 packs of blue lollipops and 18 packs of green lollipops. How many lollipops will they buy altogether?

32 x 4 + 18 x 5

128 + 90 = 218

3) The baker's oven can bake 28 loaves of bread at a time. In a day, it can go through 30 full bakes. How many loaves of bread would be baked after 1 week?

28 x 30 x 7 = 5880

4) Ms Purple sells cars for a living. In one day, she sells 2 blue cars (at £4500 each), 7 yellow cars (at £6000 each) and 12 black cars (at £8000 each). How much money does she take in car sales in that one day?

2 x 4500 + 7 x 6000 + 12 x 8000

= £147,000

5) Coaches carry 58 people. A school decides to take its 300 pupils and 38 staff on a visit to the beach. A single coach costs £128. How much will the total cost of the coaches come to?

300 + 38 = 338

338 ÷ 58 = 5.8 so 9 coaches

9 x 128 = £1152

RATIO, PROPORTION AND BEST BUYS

Questions:	Answers:
Simplify a) 3 : 6 b) 15 : 5 c) 12 : 36 d) 16 : 56 e) 20 : 44 f) 18 : 81 g) 5 : 10 h) 12 : 18 i) 26 : 52 j) 21 : 28 k) 15 : 55 l) 24 : 56	a) 1 : 2 b) 3 : 1 c) 1 : 3 d) 4 : 14 e) 5 : 11 f) 2 : 9 g) 1 : 2 h) 2 : 3 i) 1 : 2 j) 3 : 4 k) 3 : 11 l) 6 : 14 = 3 : 7
Fill in the blanks to find the equivalent ratios. a) 3 : 6 = 6 : 12 b) 15 : 5 = 30 : 10 c) 18 : 4 = 9 : 2 d) 3 : 5 = 15 : 25 e) 1 : 6 = 3 : 18 f) 5 : 13 = 10 : 26 g) 5 : 1 = 30 : 6 h) 2 : 9 = 6 : 27	i) 2 : 17 = 4 : 34 j) 23 : 7 = 46 : 14 k) 150 : 50 = 15 : 5 l) 7 : 10 = 49 : 70 m) 10 : 13 = 30 : 39

1) There are 32 pupils in a class. 20 of them are girls. What is the ratio of boys to girls in its simplest form?

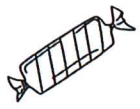
32	
20	12

20 : 12
10 : 6
5 : 3

2) A fruit drink is made by mixing 60ml of orange juice with 180ml of pineapple juice. What is the ratio of orange juice to pineapple juice in its simplest form?

60 : 180
6 : 18
1 : 3

3) There are 50 sweets in a mixed pack. 25 are jellies, 10 are fizzy cola bottles and the rest are boiled. Write the ratio of each type of sweet in its simplest form.



50		
25	10	15

25 : 10 : 15
5 : 2 : 3

4) Concrete is made by mixing sand, water and concrete mix in the ratio of 6 parts sand, 3 parts water and 3 parts concrete mix. What ratio is this in its simplest form?

6 : 3 : 3
2 : 1 : 1

Divide in these ratios.

1) Divide £50 into the ratio 1 : 4
2) Divide 40 litres into the ratio 1 : 3
3) Divide 500g into the ratio 2 : 3
4) Divide £10 in the ratio 2 : 3
5) Divide 100ml into the ratio 3 : 7
6) Divide 30cm into the ratio 2 : 4

1) £10 : £40
2) 10L : 30L
3) 200g : 300g
4) £4 : £6
5) 30mL : 70mL
6) 10cm : 20cm

1) Mr Martin has 120 CDs. The ratio of indie CDs to dance CDs is 5 : 7. How many of each type of CD does he have?

5 + 7 = 12
120 ÷ 12 = 10

50 : 70

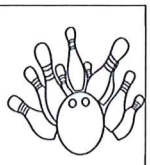
2) Mr Martin has 36 calculators in a box. The ratio of ordinary calculators to scientific is 5 : 1. How many of each calculator does he have?

30 : 6

3) There are 1400 students in Plantsbrook School with a ratio of 4 : 3 boys to girls. How many boys and how many girls are there?

800 : 600

4) 180 people go bowling, the ratio of adults to children is 5 : 4. How many adults and how many children go bowling?



100 : 80

Proportion

1. An orange drink is made using one part orange juice to 4 parts water. How many litres of orange juice and water are needed to make:
   a. 5 litres of orange drink?
   b. 20 litres of orange drink?

O:W
1 : 4

a) 1L : 4L

b) 4L : 16L

2. A supermarket uses ¾ of its space for food and the rest to non-food items. It had 100 square metres for food items. How many square metres did it have for food?

100 ÷ 4 = 25

75 m^2 for food

25 m^2 for non food

3. A green paint is made by mixing three parts of blue paint with seven parts of yellow paint. How many litres of blue and yellow paint are needed to make:
   a. 20 litres of green paint?
   b. 5 litres of green paint?

B : Y
3 : 7 = 10

6L : 14L

1.5L : 3.5L

4. 5 miles is approximately 8km.
   a. How many miles are equal to 24km?
   b. How many km are equal to 25 miles?

24 ÷ 8 = 3 3 × 5 = 15 miles

25 ÷ 5 = 5 5 × 8 = 40km

5. 30cm is approximately 1 foot. Approximately how many feet are there in:
   a. 120cm? 4
   b. 15cm? 0.5
   c. 45cm? 1.5

6. Four cakes cost £10. How much will twelve cakes cost?

4 = 10
12 = 30

7. Six towels cost £18. What will three towels cost?

6 = 18
3 = £9

8. Ten candles cost £12. What will fifteen candles cost?

10 = 12
5 = 6
15 = £18

9. A lorry travels at 60 miles per hour on the motorway.
   a. How far will it travel in 3 hours?
   b. How far will it travel in 15 minutes?
   c. How far will it travel in 3 hours and 15 minutes?

a) 60 × 3 = 180miles

b) 60 ÷ 4 = 15miles

c) 180 + 15 = 195miles

* Plants are sold in three different sizes of tray.

A small tray of 30 plants costs £6.50.
A medium tray of 40 plants costs £8.95.
A large tray of 50 plants costs £10.99.

Kaz wants to buy the tray of plants that is the best value for money.

Which size of tray of plants should she buy?
You must show all your working out.

6.50 ÷ 30 = £0.216 per plant
8.95 ÷ 40 = £0.22375 per plant
10.99 ÷ 50 = £0.2198 per plant

Best value.

EXPANDING, FACTORISING, SUBSTITUTION AND SOLVING

Simplify

Expand

Factorise

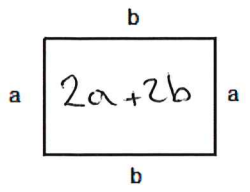
Substitute

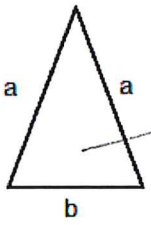
Solve

Questions:	Answers:
Question 1 Write the expressions: a) 5 less than h b) 6 more than c c) v more than 8 d) y less than 3	 $h - 5$ $c + 6$ $8 + v$ $3 - y$

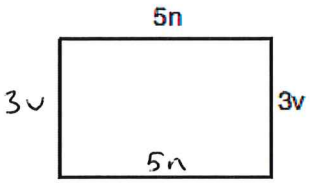
Question 2

Write down expressions for the perimeter of the following:



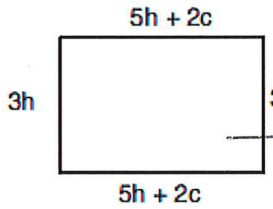


$2a + b$



$5n + 3v + 5n + 3v$

$= 10n + 6v$



$5h + 2c + 3h + 5h + 2c + 3h$

$= 16h + 4c$

Question 3

Simplify:

a) $3a \times a = 3a^2$

b) $4c \times 8d = 32cd$

c) $3b^2 \times 7b = 21b^3$

d) $a \times a \times b \times a \times b = a^3b^2$

e) $b^3 \div b = b^2$

f) $(b^4 \div b) \times b = b^3 \times b = b^4$

Question 4

If a = -2, b = 5 and c = -9, find the value of:

a) a + 5

b) 3b - 1

c) bc

a) $-2 + 5 = 3$

b) $3 \times 5 - 1 = 14$

c) $5 \times -9 = -45$

d) $c^2 - b^2$ e) a(b + 2c) f) 7a - 3b + c g) (abc) - (bca)	d) $(-9)^2 - (-2)^2$ $81 - 4 = 77$ e) $-2(5 + 2(-9)) = -2(5 - 18)$ $= +26$ f) $-14 - 15 + -9 = -38$ g) $90 - 90 = 0$
Question 5 Solve: a) $x + 3 = 12$ b) $f - 7 = 13$ c) $7m = 35$ d) $\frac{t}{4} = 8$	a) $x = 9$ b) $f = 20$ c) $m = 5$ d) $t = 32$
Question 6 Expand and simplify: a) 3(a + 2) b) 2v + 3(2v - 4) c) 15x - 4(3x - 5) d) 9y - 4(3 + 2y) e) 2(a -4) + 7(x + 2)	a) $6a + 6$ b) $2v + 6v - 12 = 8v - 12$ c) $15x - 12x + 20 = 3x + 20$ d) $9y - 12 - 8y = y - 12$ e) $2a - 8 + 7x + 14$ $= 2a + 7x + 6$
Question 7 Factorise: a) 2x + 4 = $2(x+2)$ b) 7x - 35 = $7(x-5)$ c) 12b - 8 = $4(3b-2)$ d) 45 - 30x = $5(9-6x)$ e) 9y + 12x - 3z = $3(3y+4x-z)$ f) 84z + 60y = $12(7z+5y)$	

Question 8 Solve: a) $4x + 1 = 9$ b) $2x - 3 = 7$ c) $6 = 8x - 2$ d) $9 + 6x = 33$	a) $4x = 8 \quad x = 2$ b) $2x = 10 \quad x = 5$ c) $8 = 8x \quad x = 1$ d) $6x = 24 \quad x = 4$
Question 9 Solve: a) $4(x + 2) = 24$ b) $2(x-4) = 12$ c) $5(x - 3) = 25$ d) $6(x + 2) = 30$	a) $4x + 8 = 24$ $4x = 16 \quad x = 4$ b) $2x - 8 = 12$ $2x = 20 \quad x = 10$ c) $5x - 15 = 25$ $5x = 40 \quad x = 8$ d) $6x + 12 = 30$ $6x = 18$ $x = 3$

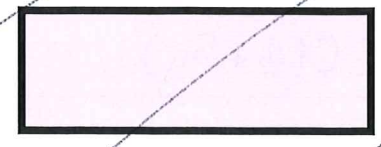
1) I think of a number. I multiply it by 6 and add 3. If my answer is 75, calculate the number I started with.

$6n + 3 = 75$
$6n = 72$
$n = 12$

2) I think of a number. If I multiply it by 5 and divide by 8 I get my answer 10. Form an equation and work out what number was I thinking off.

$\frac{5n}{8} = 10 \quad 5n = 80 \quad n = 16$

3) The perimeter of the rectangle below is 42cm. Calculate the lengths of the sides by forming an equation and solving it.



ROUNDING AND ESTIMATION

Decimal places

Significant figures

Estimation

1. Round each of the following numbers as stated:

   (a) 47 368 to 1 significant figure, 80,000

   (b) 2312 to 2 significant figures, 2300

   (c) 0.00637 to 2 significant figures, 0.0064

   (d) 8888 to 3 significant figures. 8890

2. Round each of the following numbers as stated:

   (a) 3.725 to 2 decimal places, 3.73

   (b) 0.069 to 2 decimal places, 0.07

   (c) 3.7449 to 3 decimal places, 3.745

   (d) 4.392 to 1 decimal place. 4.4

3. Use your calculator to do the following calculations. Give your answers to 1 decimal place.

(a) $\frac{3+8}{2} = 5.5$

(b) $\frac{5}{6} + \frac{2}{9}$ $1.05\dot{} = 1.1$

(c) $\frac{15-3}{21-8} = 0.923\ldots$ $= 0.9$

(d) $\frac{4 \times 6}{3+14} = 1.41\ldots = 1.4$

4. Estimate the answer to each of the following calculations:

(a) 4.9×19.6 $5 \times 20 = 100$

(b) 14.32×27.3 $10 \times 30 = 300$

(c) 16.3×11.61 $20 \times 10 = 200$

(d) $\frac{58.37}{29.3}$ $= \frac{60}{30} = 2$

1) A box of books weighs 26kg. Estimate the weight of 38 boxes.

$30 \times 40 = 1200\text{kg}$

2) The floor of a rectangular room measures 3.8m by 4.1m. Estimate the area of the room in m^2.

$4 \times 4 = 16m^2$

3) A school purchases 194 calculators at a cost of £8.16 each. Estimate the total cost of the purchase.

$200 \times 8 = £1600$

4) A can of soda costs £0.59. Estimate the total cost of 25 cans.

$0.6 \times 25 = £15$

PROBABILITY

1. What fractions would you use to describe:
   a. the chance of picking a red card at random from a pack of 52 cards? $\frac{1}{2}$
   b. the chance of picking a club card? $\frac{1}{4}$

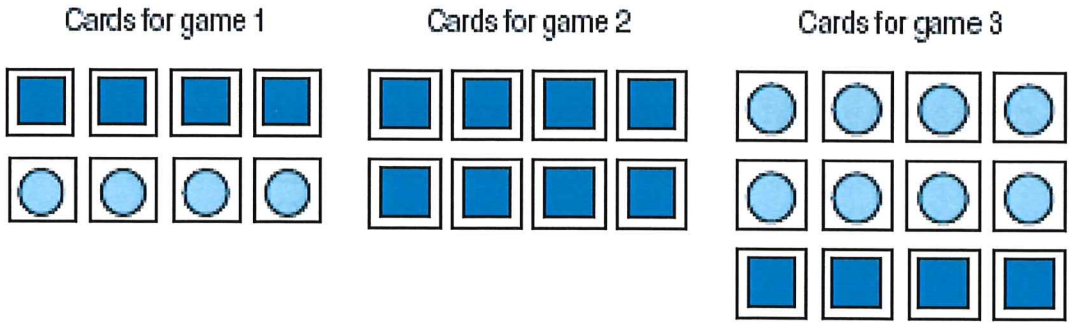
2. What is the probability of rolling, on a normal dice :
   a. a 5? $\frac{1}{6}$
   b. an odd number? $\frac{1}{2}$
   c. zero? 0
   d. a number greater than 2? $\frac{4}{6}$
   e. a number lying between 0 and 7? 1

3. A newsagent delivers these papers, one to each house.

Sun 250	*Times* 120	} 1050
Mirror 300	*Mail* 100	
Telegraph 200	*Express* 80	

What is the probability that a house picked at random has:
a. the *Times*? $\frac{120}{1050}$
b. the *Mail* or the *Express*? $100+80 = \frac{180}{1050}$

4. A class is going to play three games. In each game some cards are put into a bag. Each card has a square or a circle on it. One card will be taken out, then put back. If it is a circle, the girls will get a point. If it is a square, the boys will get a point.



a. Which game are the girls most likely to win? Why? 3

b. Which game are the boys least likely to win? Why? 2

c. Which game is impossible for the girls to win? 2
d. Which game are the boys certain to win? 3
e. Which game is it equally likely that the boys or girls win? 1

f. Are any of the games unfair? Why?

Probability from two way tables

1. The two way table shows the distribution of members of the audience at a play.

	Stalls	Circle	Balcony	Total
Adults	36	39	37	112
Children	41	21	31	93
Total	77	60	68	205

(a) Complete the two way table

(b) What is the probability that a randomly chosen audience member is an adult and is seated on the balcony?

$\frac{37}{205}$

(c) What is the probability that a randomly chosen audience member is a child seated in the circle?

$\frac{21}{205}$

(d) What is the probability that a randomly chosen audience member is an adult?

$\frac{112}{205}$

(e) What is the probability that a randomly chosen audience member is sat on the balcony?

$\frac{68}{205}$

(f) What is the probability that a randomly chosen audience member is seated in the stalls?

$\frac{77}{205}$

(e) What is the probability that a randomly chosen audience member is a child?

$\frac{93}{205}$

AVERAGES

Mode:

Is the one we see the most of.

Median:

The middle nº of an ordered set of data.

There maybe 2 numbers in the middle if there is an even nº of data items. Find halfway between them.

Mean:

Add all data together & divide by the nº of items of data.

Range:

Range = Biggest nº − Smallest nº.

From a table

Find the mean, median, mode and range for the number of glasses of lemonade drunk by people at the following party:

Glasses of Lemonade		Frequency		Lemonade × Freq
1	×	3	=	3
2	×	7	=	14
3	×	3	=	9
4	×	1	=	4

3
Median → 10
13
14

Total = 14

Total = 30

Mode = 2.

Median = 2.
(7th/8th data item)

Range = 4 − 1
= 3.

Mean = $\frac{30}{14}$ = 2.142857

= 2.1 glasses.

1) Find the average age:

mode = 20 median = 19. (12th value)

	Age		Frequency		Age × Freq
5	18	×	5	=	90
10	19	×	5	=	95
median 19	20	×	9	=	180
23	21	×	4	=	84
			T = 23		T = 449

$$\text{mean} = \frac{449}{23} = 19.5.$$

2) The number of goals scored in 15 hockey matches is shown in the table.

Number of goals		Number of matches		G × m
1	×	2	=	2
3	×	1	=	3
5	×	5	=	25
6	×	3	=	18
9	×	4	=	36
		T = 15		T = 84.

Calculate the mean number of goals scored.

$$\text{mean} = \frac{84}{15} = 5.6 \text{ goals.}$$

What is the modal number of goals scored?

mode = 5 goals.

What is the range for the number of goals scored?

Range = 9 − 1
= 8.

PERCENTAGES

1) Find the following percentage of amount.

a.50% of 320

$= \frac{50\%}{100\%} \times 320 = 160$

b. 25% of 280

$= \frac{25\%}{100\%} \times 280 = 70$

c. 10% of 45

$= \frac{10\%}{100\%} \times 45 = 4.5$

d. 60% of 200

$= \frac{60\%}{100\%} \times 200 = 120$

e. 5% of 58

$= \frac{5\%}{100\%} \times 58 = 2.9$

f. 20% of 40

$= \frac{20\%}{100\%} \times 40 = 8$

g. 15% of 65

$= \frac{15\%}{100\%} \times 65 = 9.75$

h) 99% of £70

$= \frac{99\%}{100\%} \times £70 = £69.30$

(Not 69.3)

2) Increase/Decrease the following:

a. Increase £40 by 30%? 1.3

$= 1.3 \times £40 = £52$

b. Decrease 60cm by 12% 0.88 (100% − 12% = 88%)

$= 0.88 \times 60 = 52.8cm$

c. Increase 420kg by 15% 1.15

$= 1.15 \times 420 = 483kg$

d. Decrease 900lb by 45% 0.55

$= 0.55 \times 900 = 495lb$

d. Increase £50 by 24% 1.24

$= 1.24 \times £50$

$= £62$

f. Decrease 70 metres by 10% then increase it by 10%. 0.9 1.10

a) $0.9 \times 70 = 63m$

b) $1.10 \times 63 = 69.3m$

AREA

Rectangle

$= L \times w$

Triangle

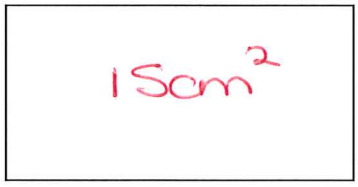
$= \frac{b \times h}{2}$

Circle

$= \pi r^2$

1. Find the area of the following rectangles:

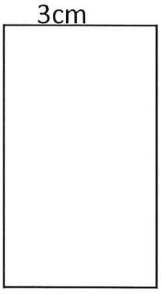
a)



$15cm^2$

Area $= L \times w$
$= 3 \times 5$
$= 15cm^2$.

b)

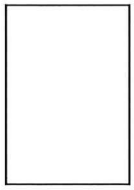


Area $= L \times w$
$= 3 \times 4$
$= 12cm^2$.

c)

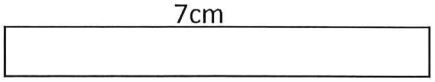
Area $= L \times w$
$= 2 \times 3$
$= 6cm^2$

d)



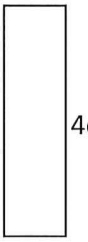
Area $= L \times w$
$= 2 \times 3$
$= 6cm^2$

e)



Area $= L \times w$
$= 7 \times 1$
$= 7cm^2$.

f)



Area $= L \times w$
$= 1 \times 4$
$= 4cm^2$

SCATTERDIAGRAMS

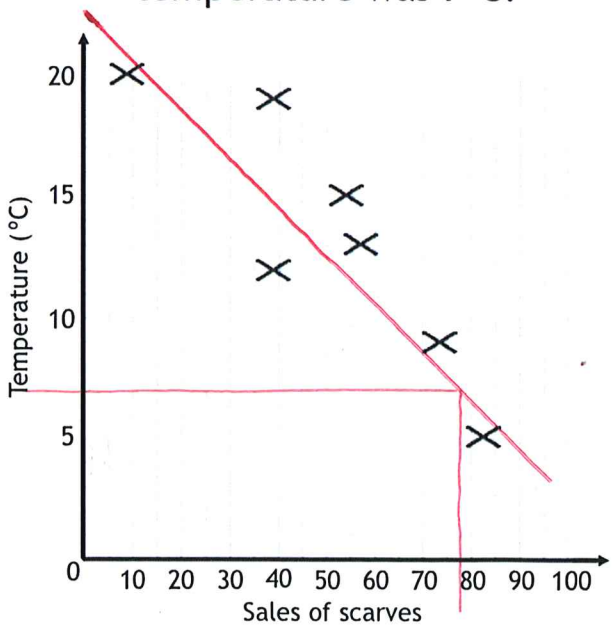
correlation

Positive

negative

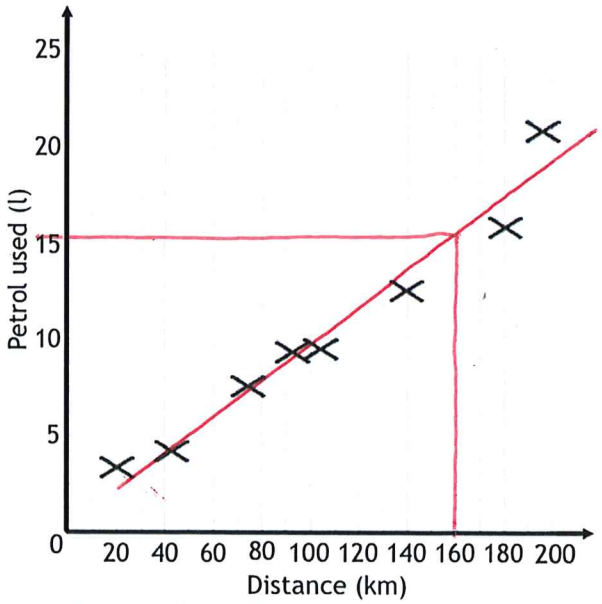
line of best fit

Estimate, using your graph, how many scarves the shop would sell when the temperature was 7°C.



Anything in the range 75-85 scarves.

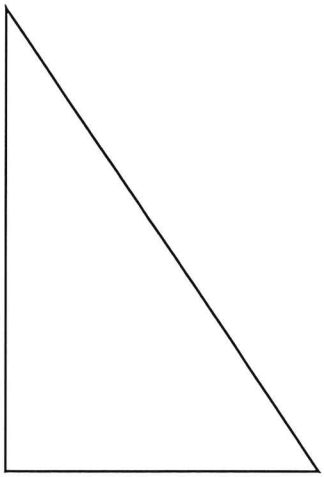
Estimate, using your graph, how many litres of petrol the car would use on a journey of 160km.



Anything in the range of 13 - 18 Litres.

3)Find the area of the following triangles.

a)

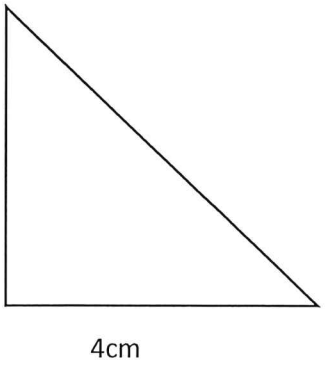


$\text{Area} = \frac{b \times h}{2}$

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

$= 3\text{cm}^2$

b)

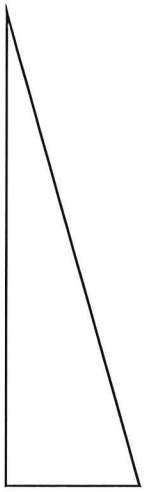


$\text{Area} = \frac{b \times h}{2}$

$= \frac{4 \times 4}{2}$

$= 8\text{cm}^2$

c)



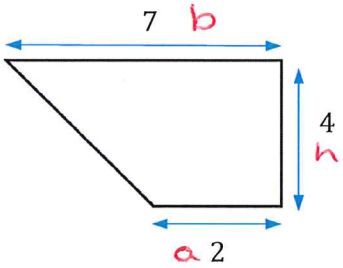
$\text{Area} = \frac{b \times h}{2}$

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

$= 3\text{cm}^2$.

3) Find the area of each of the shapes.

a.



Area Trapezium $= \frac{(a+b) \times h}{2}$

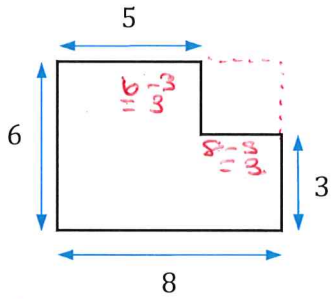
$= \frac{(2+7) \times 4}{2}$

$= \frac{9 \times 4}{2}$

$= \frac{36}{2}$

$= 18\text{cm}^2$.

b.



Area $= L \times w$

$\square 8 = 6 \times 8$

$= 48\text{cm}^2$.

Area $= L \times w$

$\square 3 = 3 \times 3$

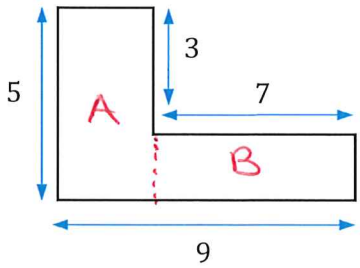
$= 9\text{cm}^2$.

Shaded Area $= \square - \square$

$= 48 - 9$

$= 39\text{cm}^2$.

c.



Area A $= L \times w$

$= 5 \times 2$

$= 10\text{cm}^2$.

Area B $= L \times w$

$= 7 \times 2$

$= 14\text{cm}^2$.

Total Area $= A + B$

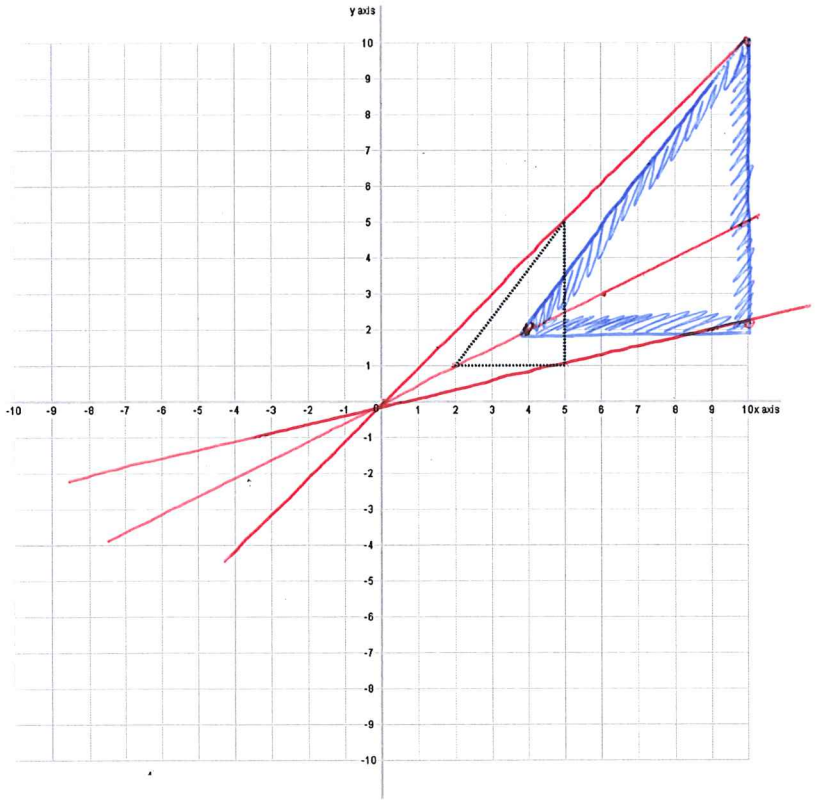
$= 10 + 14$

$= 24\text{cm}^2$

ENLARGEMENT

Scale factor

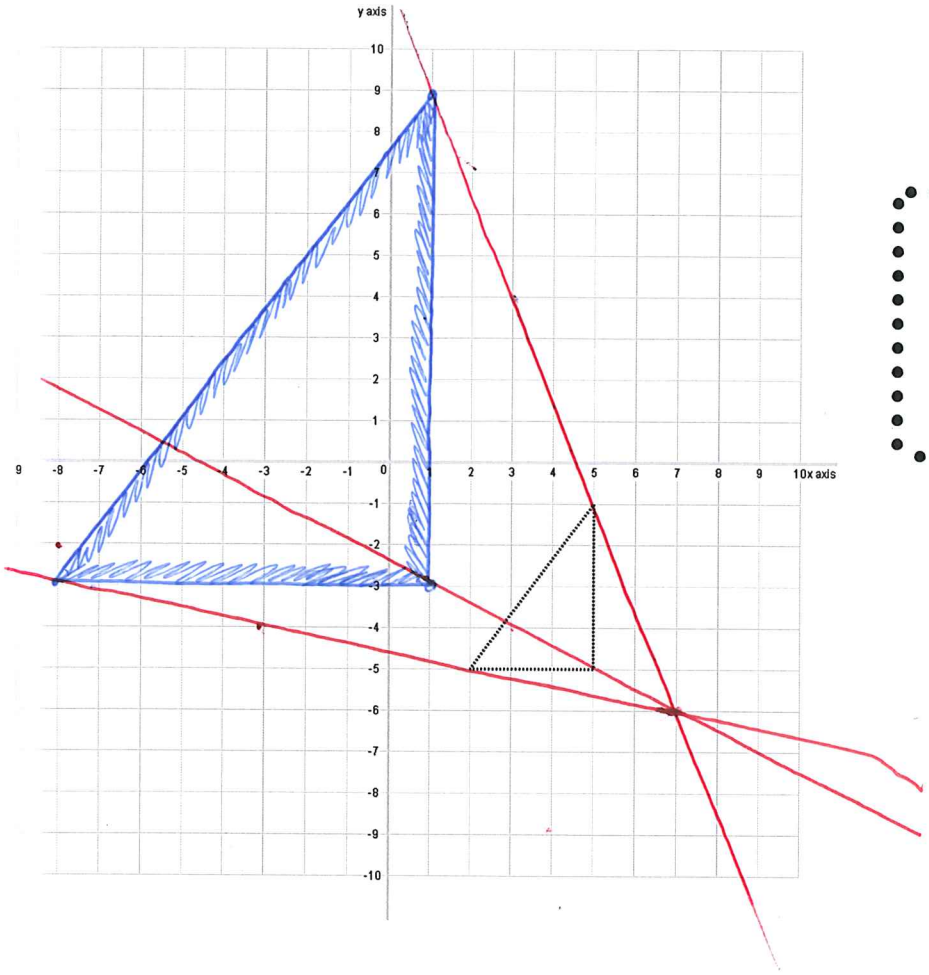
Centre of enlargement



Enlarge by scale factor

2

Centre of enlargement (0,0)



Enlarge by scale factor

3

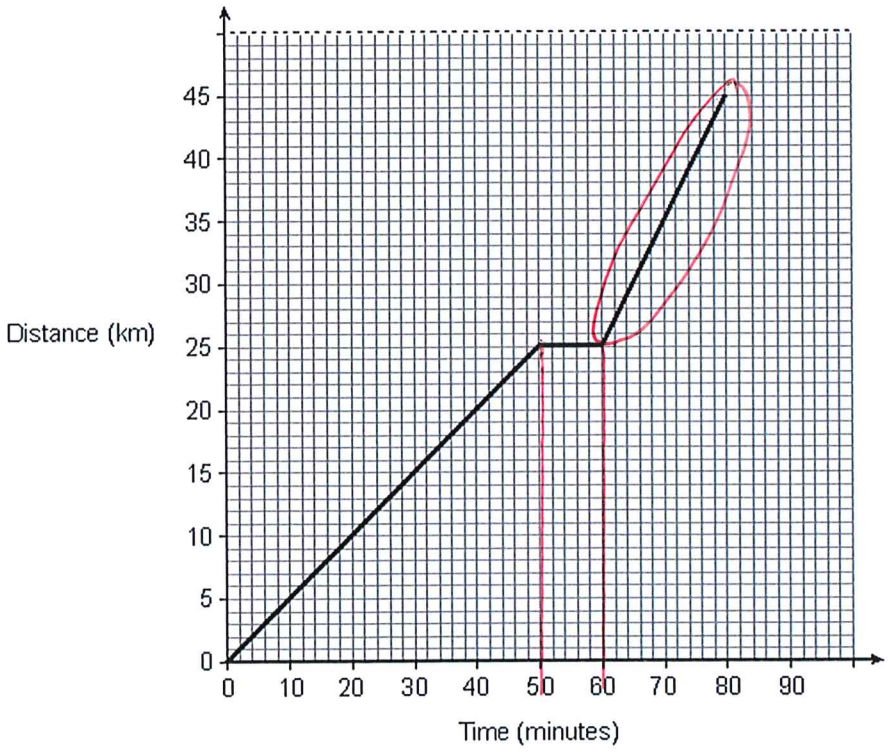
Centre of enlargement (7,-6)

DISTANCE TIME GRAPHS

Speed Time

Distance

Q1. Here is a distance-time graph for a train journey.



(a) For how long does the train stop on the journey?

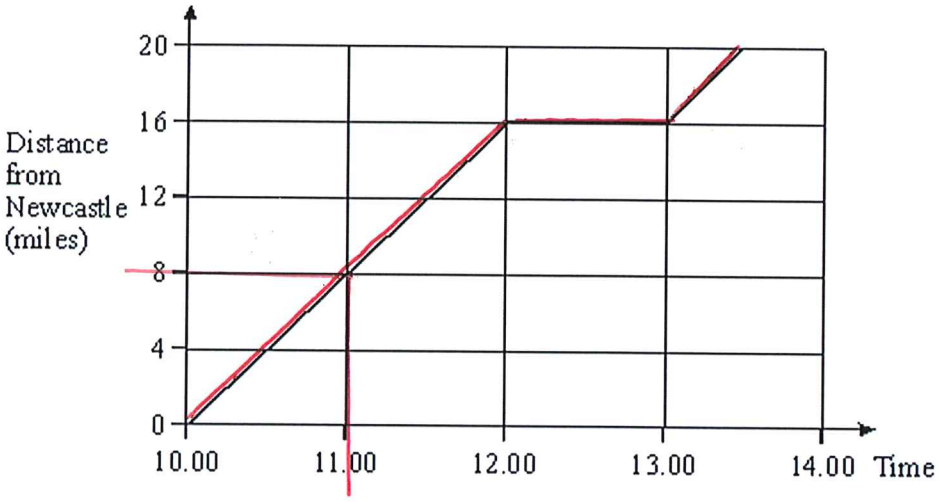
Answer 60 minutes

(b) (i) On which part of the journey does the train travel fastest?
Put a circle around the part of the graph that shows this.

it is the steepest part.

(ii) Explain how you know

Q2. Wayne cycles from Newcastle to Ashington, a distance of 20 miles.
The diagram shows the distance-time graph of his journey.



(a) How far from Newcastle is Wayne at 11.00?

Answer 8 miles

(b) Describe what is happening between 12.00 and 13.00

He is stationary - resting

(c) How far does Wayne travel in the first 2 hours of his journey?

Answer 16 miles

(d) What is Wayne's average speed over the first 2 hours of his journey?

$S = \frac{d}{T} = \frac{16}{2} = 8$ mph.

Answer 8 mph