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V.3. UPDATED 31/5/16

JustMaths

"BEST GUESS" - JUNE 2016
EDEXCEL LINEAR PAPER 2

This paper has been made up of questions for the topics that we believe are worth revising prior to paper 2 (Edexcel Linear) – as with all these things there are **no guarantees** and are our "Best Guess" for all higher tier students. This is meant to act as a practice paper and not meant to emulate the real thing – the order of the questions are not intended to act as a guide as to the level of difficulty so aim to have a go at every question.

In addition to this there are some "top end topics" you'll need to revise if you are aiming for grades A/A* but the below are the ones that you need to "nail" on your final paper. Good Luck

	Marks	Actual	
1. Use of Calculator	3		
2. Translations	2		
3. Stem and leaf	5		
4. Ratio	3		
5. Standard Form	3		
6. Depreciation	3		
7. Scatter Graphs	4		
8. Averages from a table	4		
9. Angle facts	4		
10. Product of prime factors	3		
11. Averages	3		
12. Surface area	4		
13. Exchange Rates	3		
14. Pie Charts	4		
15. Inequalities	5		
16. Bearings and trigonometry	7		
17. Sequences and *n*th term	4		
18. Plans and elevations	2		
19. Angles in polygons	3		
20. Pythagoras Theorem	3		
21. Compound Interest	3		
22. Straight line graphs	4		
23. Best Value	3		
24. Estimate of the mean/Frequency polygons	7		
25. Trial & Improvement	4		
26. Proportion recipes	4		
27. Forming & Solving equations	4		
28. Reciprocal Graphs	4		
29. Rotations & Reflections	3		
30. Enlargements	3		
31. Trigonometry	4		
32. Pythagoras & Trig	4		
33. Multiples in Context	4		
34. Similar Shapes	4		
35. Histograms	5		
36. Cumulative Frequency	4		
TOTAL	136		

Q1. Use your calculator to work out $\sqrt{\frac{920 - 170 \tan 65^o}{0.012 + 0.034}}$

Write down all the figures on your calculator display.
You must give your answer as a decimal.

$\sqrt{\frac{555.4338235}{0.040}} = \sqrt{12074.64834}$

109.8847047 ..... (2)

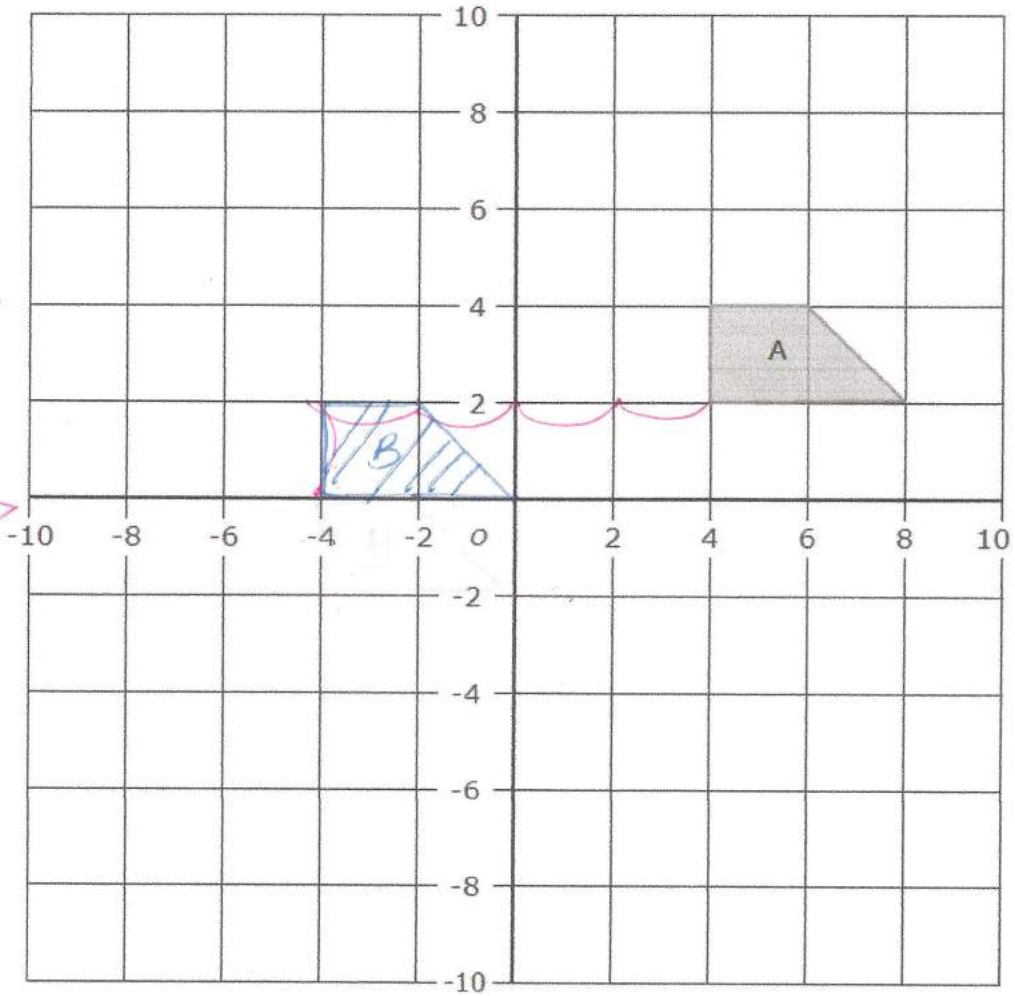
(a) Give your answer to part (a) correct to 4 significant figures.

109.9 ..... (1)

Q2.

Watchout!

Scale goes up in twos →



Translate shape A by $\begin{pmatrix} -8 \\ -2 \end{pmatrix}$ 8 left, 2 down.

Label the new shape **B.**

(2)

Q3. Use the stem and leaf diagram to find the below information

1	3 5 7 7
2	0 | 6 8 8 8 9
3	(1) 5 5 5 5 6 | 8 9
4	1 5
5	2

Key: 5 \| 2 means 5.2 cm

Median at 1/2 way.
LQ at 1/4
UQ at 3/4

(a) What is the mode.

3.5 cm (1)

(b) Work out the median.

21 data values, median at position 11

3.1 cm (2)

(c) Work out the interquartile range.

LQ = $\frac{2.0+2.6}{2}$ = 2.3 UQ = $\frac{3.6+3.8}{2}$ = 3.7 IQR = 3.7 − 2.3 = 1.4

1.4 cm (2)

Q4. Mel, Emma and Hannah share some money in the ratio 5:9:6

Mel and Emma share £56. How much does Hannah get?

Mel : Emma = 14
5 : 9 ↓×4
£20 : £36 56

Hannah
6
↓×4
£24

(3)

Q5.

(i) Write 8.411×10^{-3} as an ordinary number.

0.008411

(1)

(ii) Write 501 in Standard Index Form.

5.01×10^{2}

(1)

(iii) Write 10.9×10^{4} in Standard Index Form

1.09×10^{5}

(1)

Q6. The value of a second hand car is £6000

Each year it loses 20% of its value

Work out its value in 2 years time.

Multiplier method.
6000×0.8^{2}
= £3840

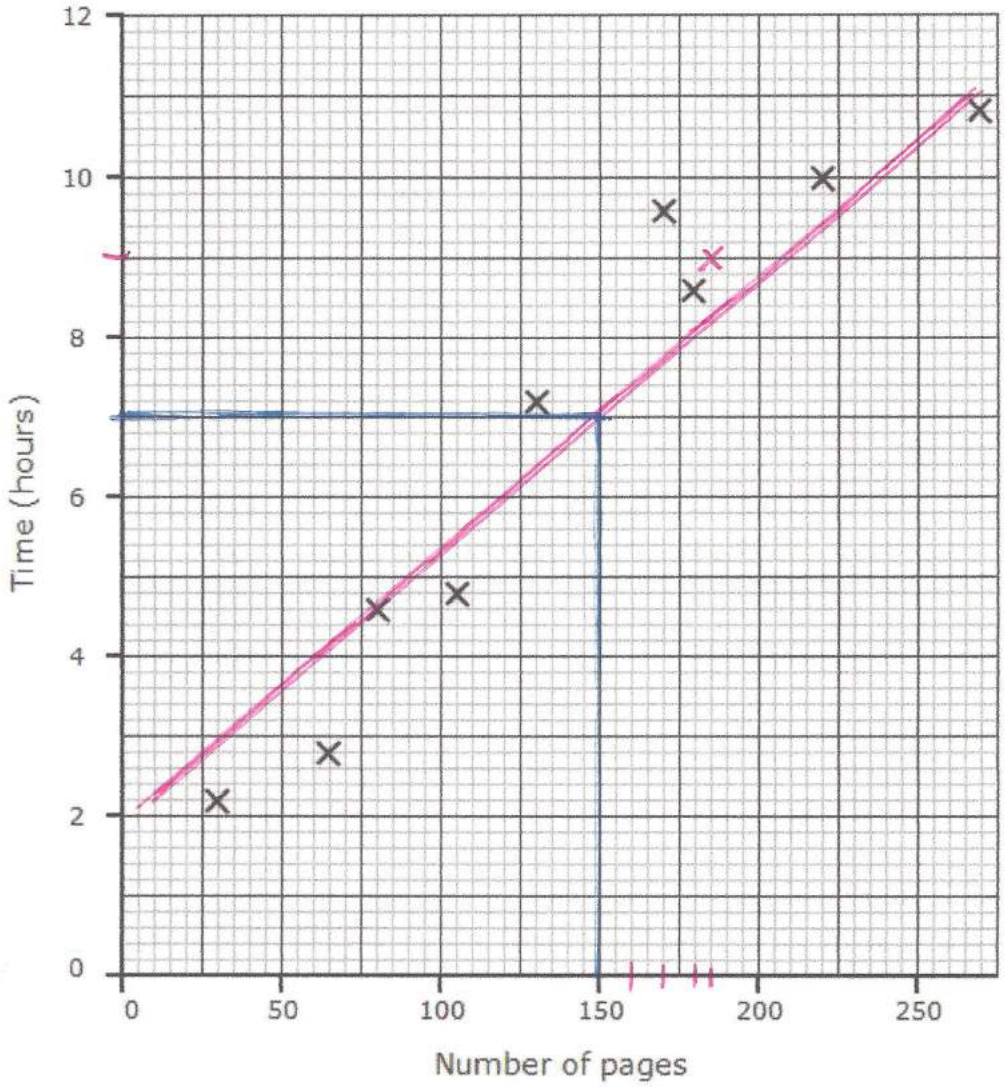
Long method.

Yr 1
20% of 6000 = 1200
6000 − 1200 = £4800

Yr 2
20% of 4800 = 960
4800 − 960 = £3840

(3)

Q7 Dawn reads eight books. For each book she records the number of pages and the time she takes to read it. The scatter graph shows information about her results.



a) Dawn reads another book with 185 pages and it takes her 9 hours to read the book. Plot this on the graph.

(1)

b) Describe the relationship between the number of pages in a book and the time Dawn takes to read it. Positive correlation.
The higher the number of pages, the longer time it takes

(1)

c) Dawn reads another book. The book has 150 pages. Estimate the time it takes Dawn to read it. 7 hours -
You must draw a line of best fit!

(2)

Q8. Lois asked 32 women about the number of children they each had.

The table shows information about her results.

Number of children	Frequency	children × f
0	9	0
1	6	6
2	7	14
3	8	24
4	2	8
More than 4	0	0
Total	32	52

Luckily the frequency here is 0, else we would need more info.

a) Find the mode

0 children

(1)

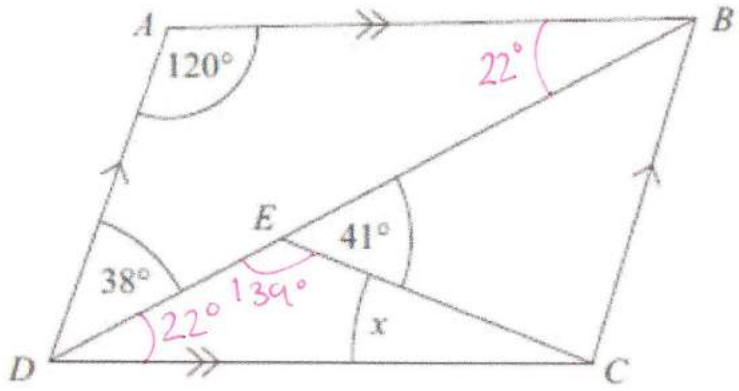
b) Calculate the mean

$52 \div 32 = 1.625$

which rounds to 2 children.

(3)

Q9. ABCD is a parallelogram.



Angle ADB = 38°.
Angle BEC = 41°.
Angle DAB = 120 °.

Calculate the size of angle x.

You must give reasons for your answer.

There are other solutions

Angle ABD = 180 − 120 − 38 = 22° | Angles in a triangle total 180°.

Angle BDC = 22° | Alternate angles are equal

Angle DEC = 139° | Angles on a straight line total 180°.

So $x = 180 - 139 - 22$

$= 19°$

Angles in a triangle total 180°

(4)

Q10. The number 1104 can be written as $3 \times 2^c \times d$, where c is a whole number and d is a prime number. Work out the values of c and d

$1104 = 2^4 \times 3 \times 23$ so $c = 4$, $d = 23$

(3)

Q11. Hertford Juniors is a basketball team.

At the end of 10 games, their mean score is 35 points per game.

At the end of 11 games, their mean score has gone down to 33 points per game.

How many points did the team score in the 11th game? show your working out.

In 10 games, $10 \times 35 = 350$ points scored.

In 11 games, $11 \times 33 = 363$ points scored.

$363 - 350 = 13$ points in game 11. (3)

Q12. Work out the total surface area of the triangular prism.

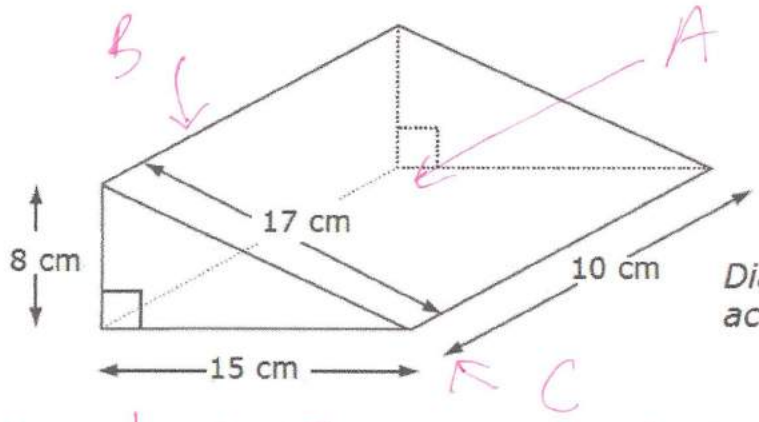


Diagram not accurately drawn

Triangle $= \frac{1}{2} \times 8 \times 15$
$= 60 cm^2$.

Rectangle B $= 8 \times 10$
$= 80 cm^2$

Rectangle A $= 17 \times 10$
$= 170 cm^2$

Rectangle C $= 15 \times 10$
$= 150 cm^2$

Total Surface Area $= 60 + 60 + 170 + 80 + 150$
$= 520 cm^2$. (4)

Q13. The exchange rate in London is £1 = €1.14

The exchange rate in Paris is €1 = £0.86

Robert wants to change some pounds into euros.

In which of these cities would Robert get the most euros? You must show all your working.

London.

£1 = €1.14

Paris.

€0.86 = €1

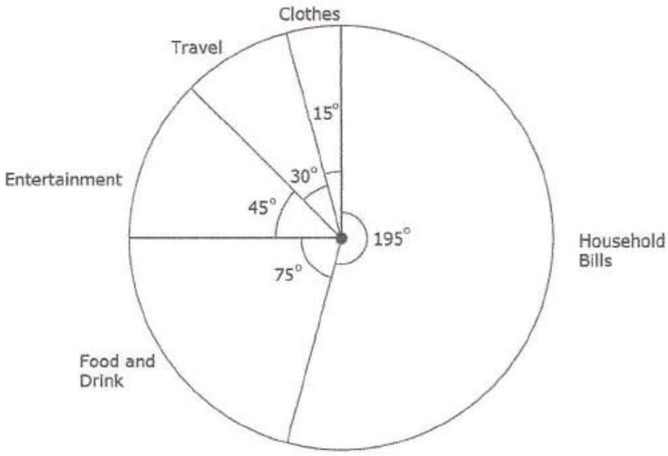
£1 = €1.162790697674...

= €1.16

This is more than in London.

PARIS. ..... (3)

Q14. The pie chart shows information about Mel's spending last month. The pie chart is accurately drawn.



a) Mel spent £80 on travel last month. Work out the amount spent on household bills.

÷30 30° = £80
1° = £2.67 (2dp) ÷30
×195 195° = £520 ×195

(2)

b) A second pie chart is to be drawn from Karen's spending.
Karen spent a total of £800 last month.
She spent £120 on entertainment last month.

Calculate the size of the angle for entertainment in the second pie chart.

$\frac{120}{800} \times 360 = 54°$

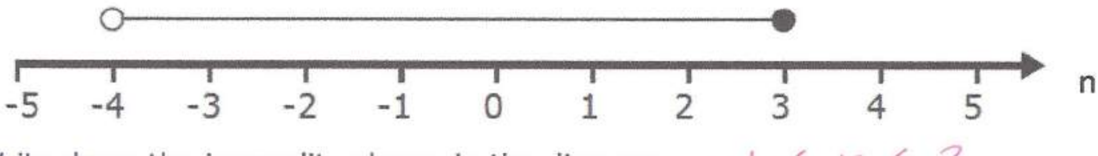
(2)

Q15. (i) *n* is an integer. $-1 \leq n < 4$

List the possible values of *n*. −1, 0, 1, 2, 3

(2)

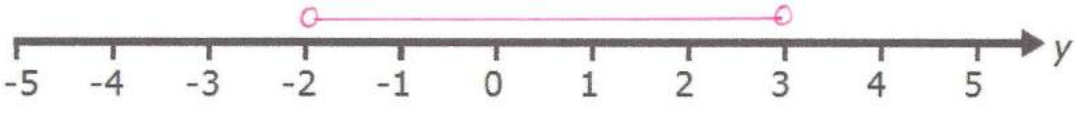
(ii)



Write down the inequality shown in the diagram. $-4 < n \leq 3$

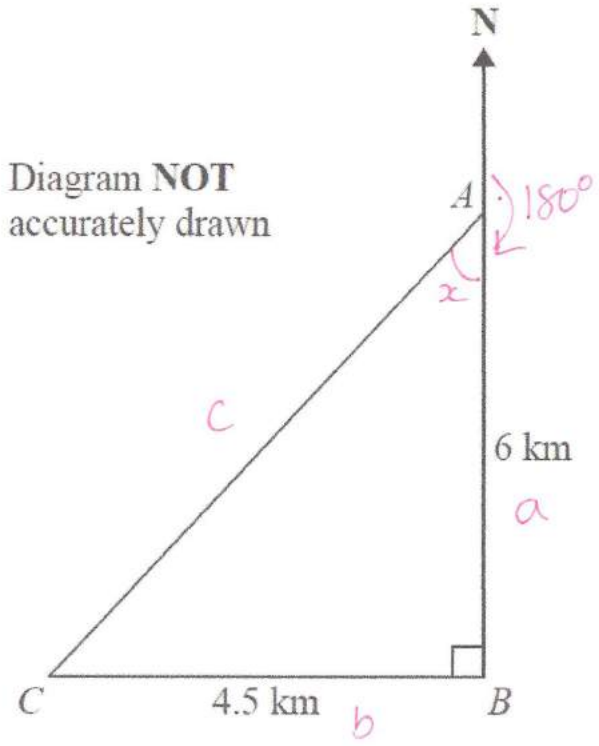
(2)

(iii) On the number line, show the inequality $-2 < y < 3$



(1)

Q16. The diagram shows the positions of three turbines A, B and C.



Always measure bearings from the NORTH, Clockwise

A is 6 km due north of turbine B.

C is 4.5 km due west of turbine B.

(a) Calculate the distance AC.

$c^2 = a^2 + b^2$

$c^2 = 6^2 + 4.5^2$

$c^2 = 56.25$

$c = 7.5$

..... km (3)

(b) Calculate the bearing of C from A.

Give your answer correct to the nearest degree.

$\tan x = \frac{4.5}{6}$

$x = 36.86989765$

$= 37°$

$180 + 37 = 217$

217 ..... ° (4)

Q17. Here are the first five terms of an arithmetic sequence.

-2 2 6 10 14 18

+4

a) Find, in terms of n, an expression for the nth term of this sequence.

$4n - 2$

(2)

b) An expression for the nth term of another sequence is $10 - n^2$

Find the third term and the fifth term of this sequence.

$n=3,\ 10-3^2$

$= 1$

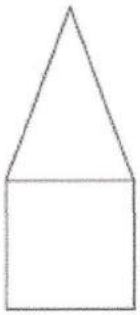
$n=5,\ 10-5^2$

$= -15$

(2)

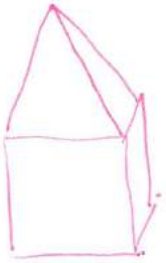
Q18. Here are the front elevation, side elevation and the plan of a 3-D shape.

Front elevation



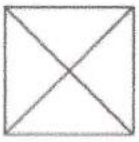
Side elevation

In the space below, draw a sketch of the 3-D shape.



sketch.

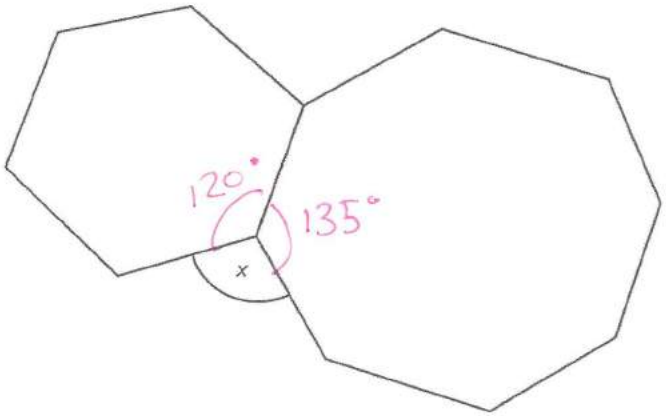
Plan



(2)

Q19. The diagram shows a regular hexagon and a regular octagon.

Hexagon:
Ext: $360 \div 6 = 60$
Int: $180 - 60 = 120°$



Octagon.
Ext: $360 \div 8 = 45$
Int: $180 - 45 = 135°$

Calculate the size of the angle marked x

You must show all your working.

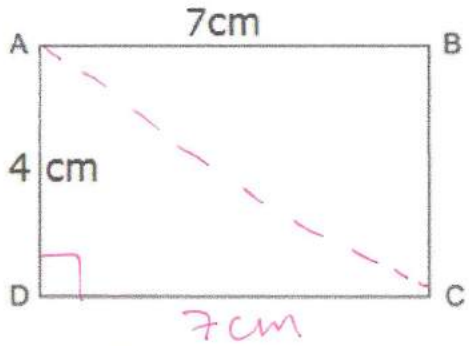
Angles around a point total 360°

$360 - 120 - 135$

$x = 105°$

(3)

Q20. ABCD is a rectangle.



Not to scale

(a) Laura calculates the length of AC, but gets it wrong.

$7^2 - 4^2 = AC^2$

$\sqrt{33} = AC$

$\sqrt{33} = 5.7$ **(to 1 decimal place)**

AC = 5.7 (to 1 decimal place)

Explain what Laura has done wrong.

$AC^2 = 7^2 + 4^2$ she should have added!

[1]

(b) Calculate the length of AC.

$AC^2 = 7^2 + 4^2$

$AC^2 = 65$

$AC = 8.062257748$ 8.1 (to 1dp).

..... m [2]

Q21. £650 is invested in a bank account for 2 years at 1.5% compound interest per year.

How much is in the account at the end of the 2 years?

Multiplier Method

650×1.015^2

$= 669.64625$

$= £669.65$

Long Method.

Yr 1. 1.5% of 650 = 9.75

650 + 9.75 = £659.75.

Yr 2 1.5% of 659.75 = 9.89625

659.75 + 9.89625

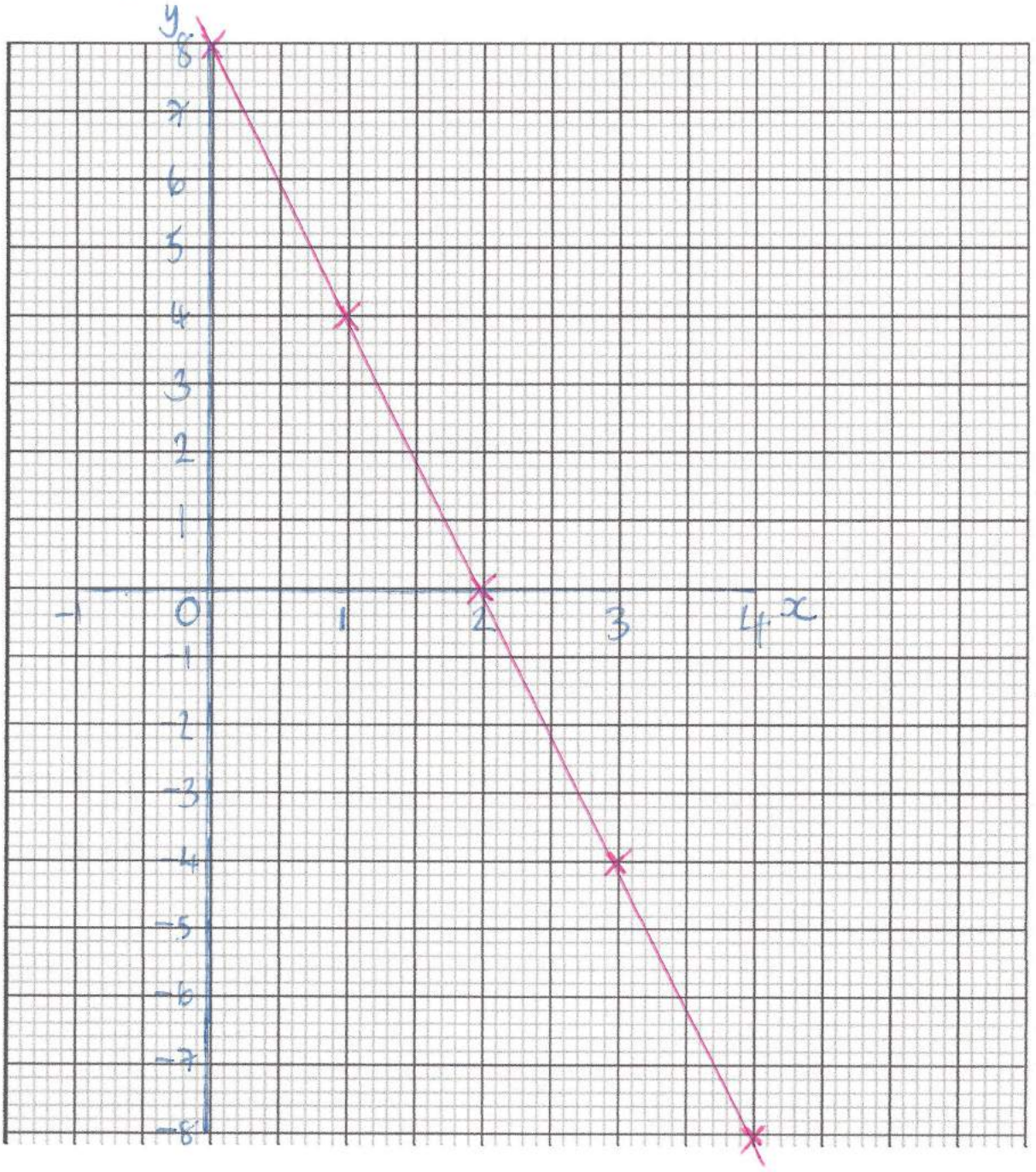
$= 669.64625$

$= £669.65$

(3)

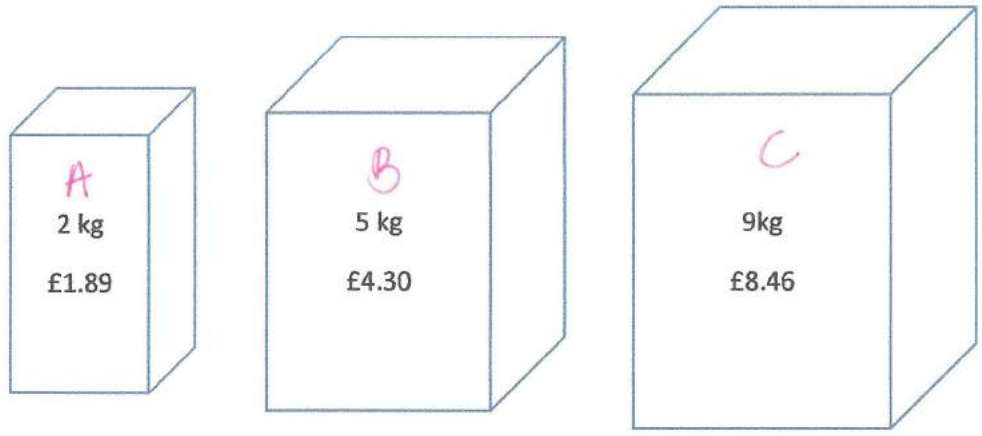
Q22. Use the grid below to draw the graph of the straight line $y = 8 - 4x$ between $x = 0$ and $x = 4$

x	0	1	2	3	4
y	8	4	0	-4	-8



(4)

Q23. Soap powder is sold in three different sizes of box.



A 2 kg box of soap powder is £1.89
A 5 kg box of soap powder is £4.30
A 9 kg box of soap powder is £8.46

Work out which size of box of soap powder gives the best value for money.

You must show how you get your answer.

A: $1.89 \div 2 = 0.945$

B: $4.30 \div 5 = 0.86$

C: $8.46 \div 9 = 0.94$

The 5kg box is best value because it is the cheapest per kg. **(3)**

Q24. The table gives information about the temperature, T °C, at noon in a town for 60 days.

Temperature (T °C)		Frequency		mid × freq.
10 - 13	11.5	7		80.5
14 - 17	15.5	9 (16)		139.5
18 - 21	19.5	16 (32)	*	312
22 - 25	23.5	22 (54)		517
26 - 29	27.5	6 (60)		165
				1214

a) Write down the class interval in which the median lies.

60 days → median between 30|31 data values

18 - 21 ..... (1)

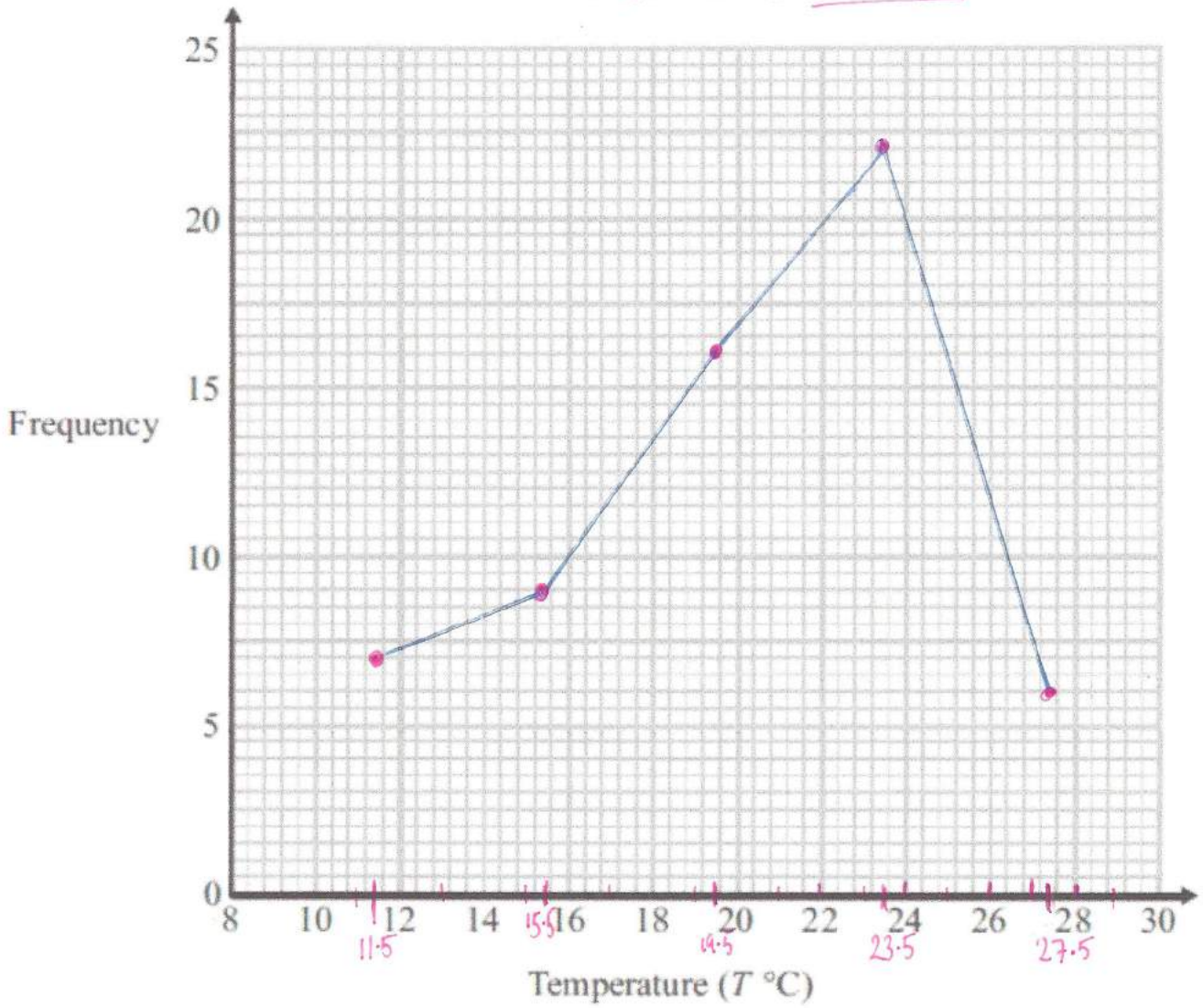
b) Calculate an estimate for the mean temperature.

$\frac{1214}{60} = 20.2\dot{3}$

20.2 (1dp) °C (4)

c) Draw a frequency polygon for the information in the table.

PLOT using MIDPOINTS.

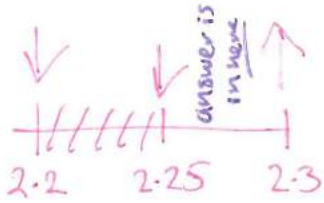


(2)

Q25. Use trial and improvement to solve this problem : $x^3 - 2x = 7$

Give your answer to 1 decimal place.
Show all your trials and their outcomes.

x	$x^3 - 2x$	Comment
3	$3^3 - 2(3) = 21$	Too big
2	$2^3 - 2(2) = 4$	Too small
2·5	$2.5^3 - 2(2.5) = 10.625$	Too big
2·4	$2.4^3 - 2(2.4) = 9.024$	Too big
2·3	$2.3^3 - 2(2.3) = 7.567$	Too big
2·2	$2.2^3 - 2(2.2) = 6.248$	Too small
2·25	$2.25^3 - 2(2.25) = 6.890625$	Too small



∴ solution is 2·3 (1dp).

(4)

Q26. The table shows the ingredients needed to make vegetable soup for 4 people.

Vegetable soup (serves 4 people)	
Vegetables	600 g
Stock	400 ml
Oil	3 tablespoons
Garlic	2 cloves

1 person	3 people	6 people.
150g	450g	900g
100ml	300ml	600ml
3/4 tbsp	2.25 tbsp	4.5 tbsp
1/2 clove	1.5 cloves	3 cloves

a) What weight of vegetables is needed to make vegetable soup for 3 people?

450g

(1)

b) How many tablespoons of oil are needed to make vegetable soup for 6 people?

4.5 tablespoons.

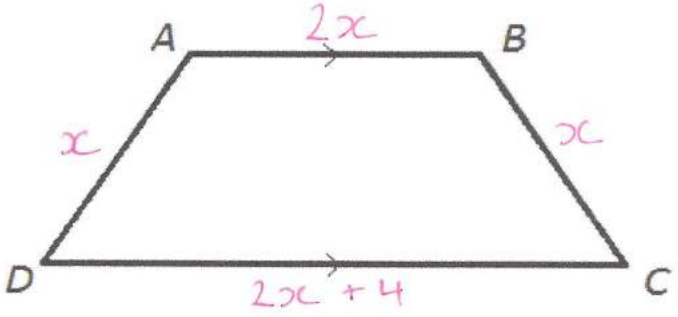
(1)

c) Matt has only 1 litre of stock. He has plenty of other ingredients. What is the maximum number of people he can make vegetable soup for?

1 person needs 100ml of stock. 1 litre = 1000ml.
so 1 litre would be enough for 10 people.
$1000 \div 100 = 10$

(2)

Q27. The diagram shows a trapezium.



AD = *x* cm.
BC is the same length of *AD*. x
AB is the twice the length of *AD*. $2x$
DC is 4 cm longer than *AB*. $2x+4$

The perimeter of the trapezium is 38 cm.

Work out the length of *AD*.

$x + x + 2x + 2x + 4 = 6x + 4$

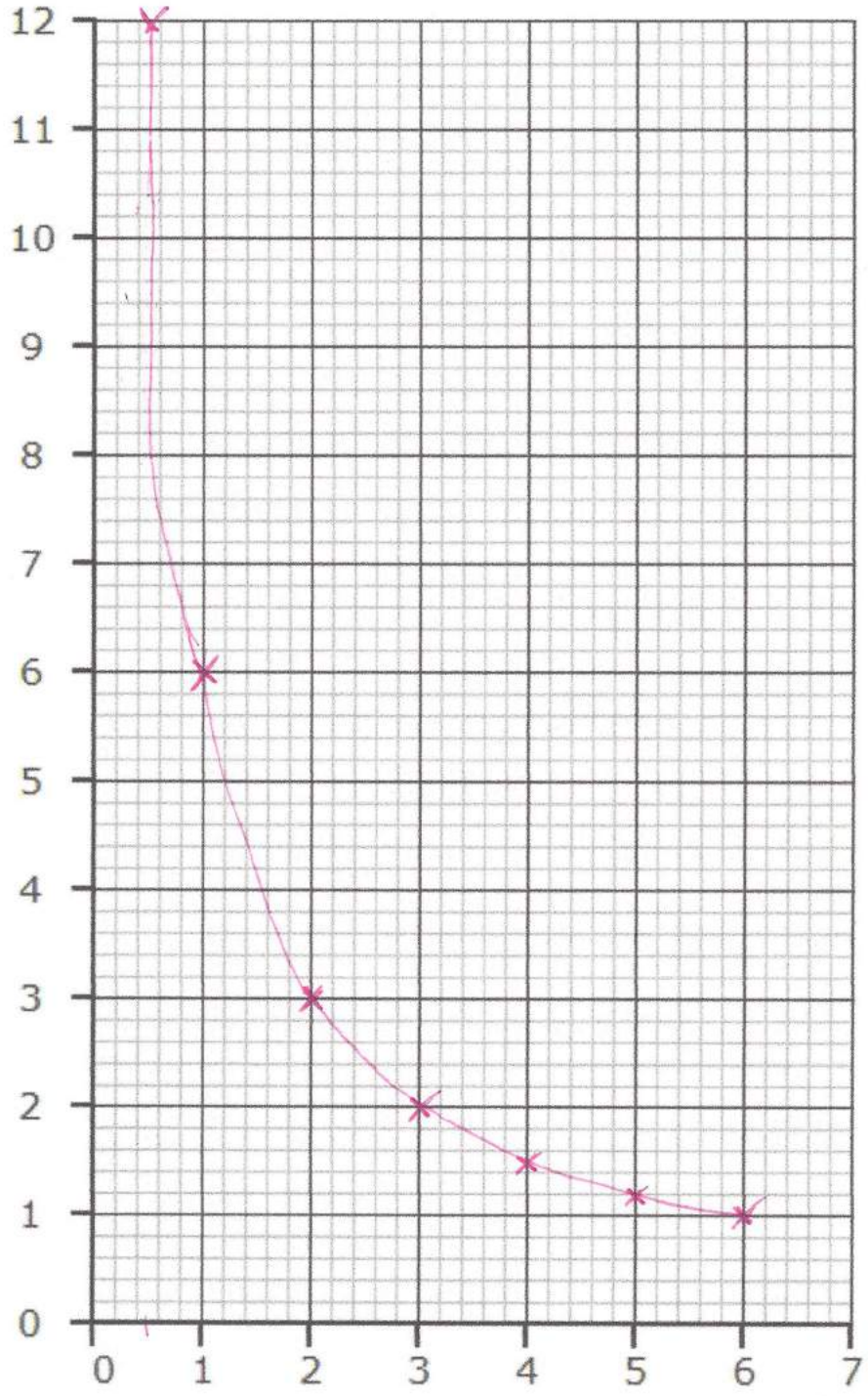
$6x + 4 = 38$
$6x = 34$
$x = 5\frac{2}{3}$ cm (5.67cm 2dp)

(4)

Q28. Complete the table of values for $y = \frac{6}{x}$

x	0.5	1	2	3	4	5	6
Y	12	6	3	2	1.5	1·2	1

(2)



a) On the grid, draw the graph of $y = \frac{6}{x}$ for $0.5 \leq x \leq 6$

(2)

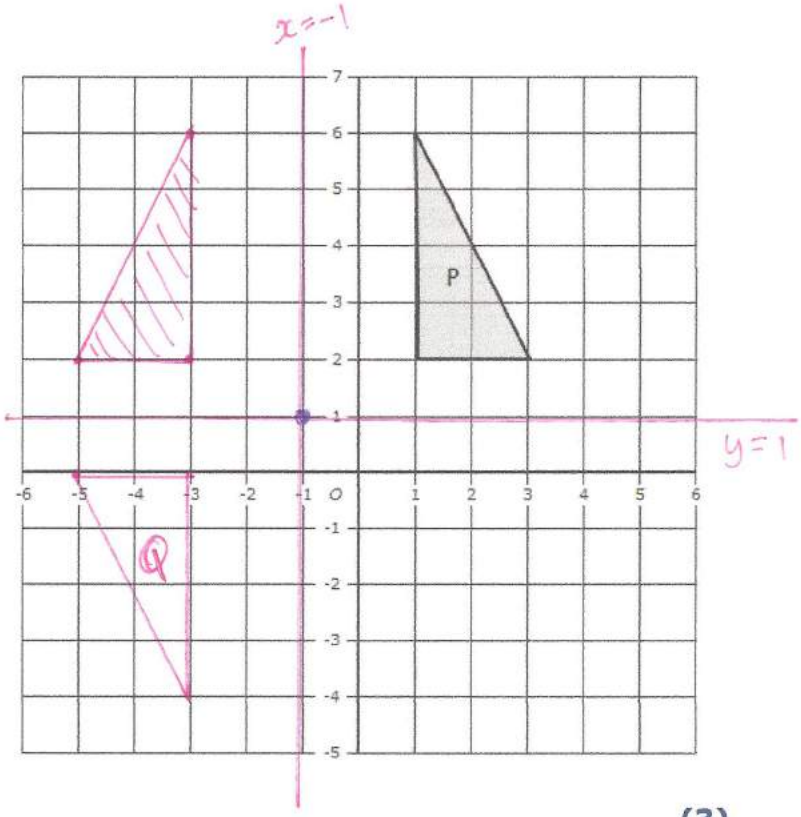
Q29.

Triangle **P** is drawn on a coordinate grid.

Triangle **P** is reflected in the line $x = -1$ and then reflected the line $y = 1$ to give triangle **Q**.

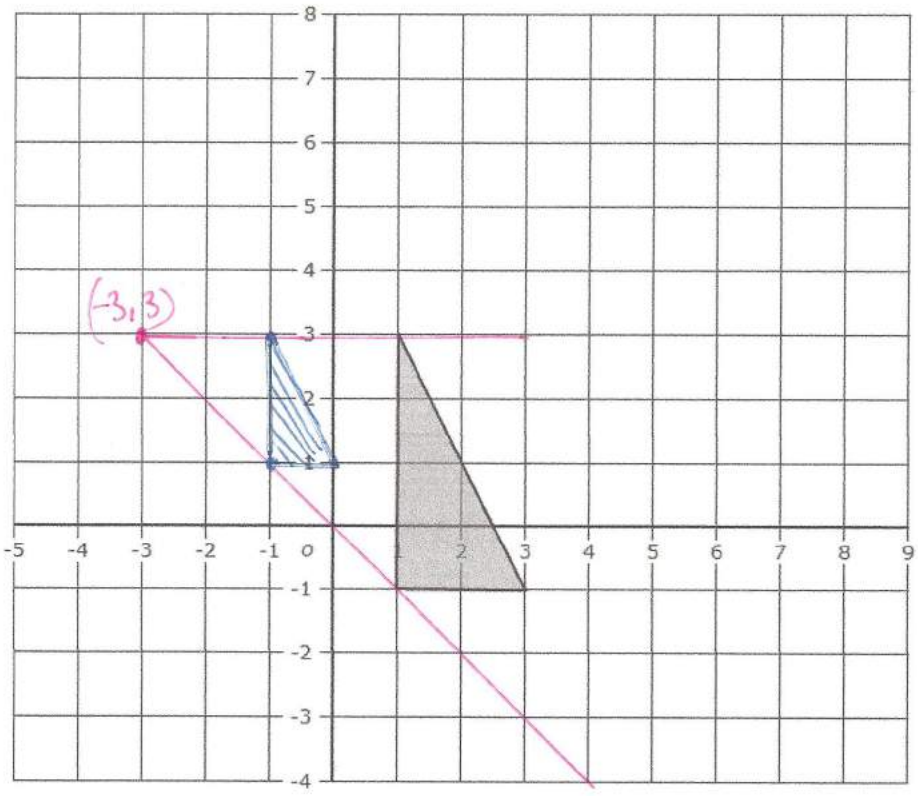
Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

Rotation
Centre (-1, 1)
180°



(3)

Q30.



Enlarge the shaded triangle by a scale factor $\frac{1}{2}$ centre *(-3, 3)*.

Half as big.

(3)

Q31 A man is working out the height of a vertical tree.

The man is able to measure the angle of elevation of the top of the tree from his measuring instrument.

The measuring instrument is 1·8m above ground level.

When the man is standing 19m from the base of the tree, the angle he measures is 56°.

A sketch of this situation is shown below.

SOHCAHTOA.

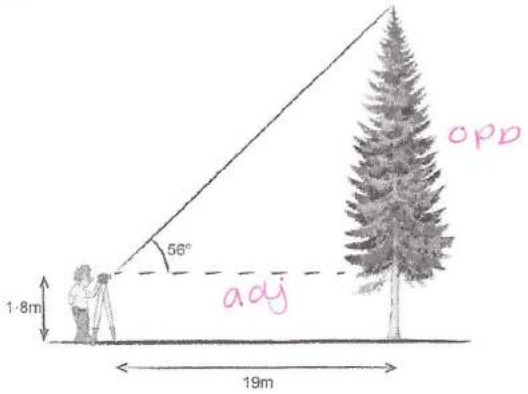


Diagram not drawn to scale

$\tan 56 = \frac{opp}{19}$

$opp = 19 \times \tan 56$

$= 28.1686584.$

Add height of instrument,

$28.1686584 + 1.8$

$= 29.9686584$

Calculate the full height of the tree.

$= 30.0$ m (1dp).

[4]

Q32. The diagram shows a quadrilateral ABCD.

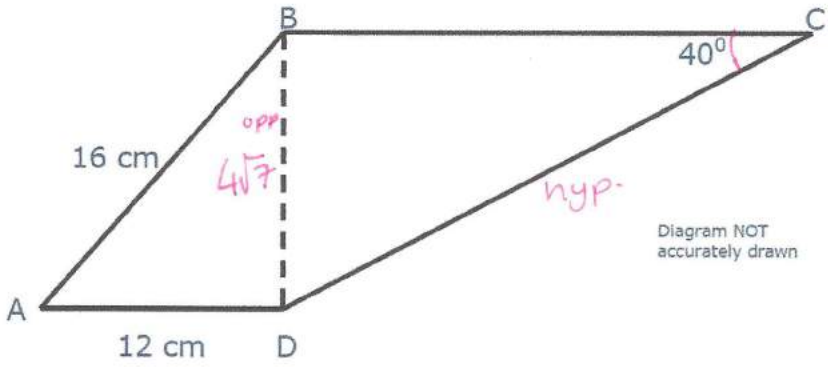


Diagram NOT accurately drawn

AB = 16 cm.
AD = 12 cm.
Angle BCD = 40°.
Angle ADB = angle CBD = 90°.

$BD^2 = 16^2 - 12^2$

$BD^2 = 112$

$BD = 4\sqrt{7}$

Calculate the length of CD.
Give your answer correct to 3 significant figures.

$\sin 40 = \frac{4\sqrt{7}}{hyp}$

$hyp = \frac{4\sqrt{7}}{\sin 40}$

$CD = 16.464233342$

$= 16.5$ cm (3sf)

(5)

Cakes	Sr.
12	8
24	16
36	24
48	32
60	40
72	48
	56
6 packs	64
	72
	9 packs.

Q33. Lisa is planning a party.

She wants to buy some cakes and some sausage rolls.

The cakes are sold in boxes.
There are 12 cakes in each box.
Each box of cakes costs £2.50

The sausage rolls are sold in packs.
There are 8 sausage rolls in a pack.
Each pack of sausage rolls costs £1.20

Lisa wants to buy more than 60 cakes and more than 60 sausage rolls. She wants to buy exactly the same number of cakes as sausage rolls.

What is the least amount of money Lisa will have to pay?

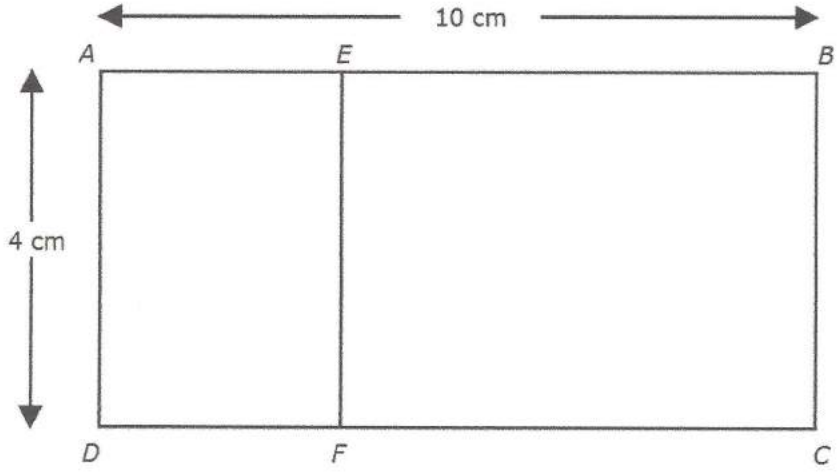
6 packs of cakes = 6 × £2.50 = £15.00

9 packs of rolls = 9 × £1.20 = £10.80

Total = 15 + 10.80
= £25.80

(4)

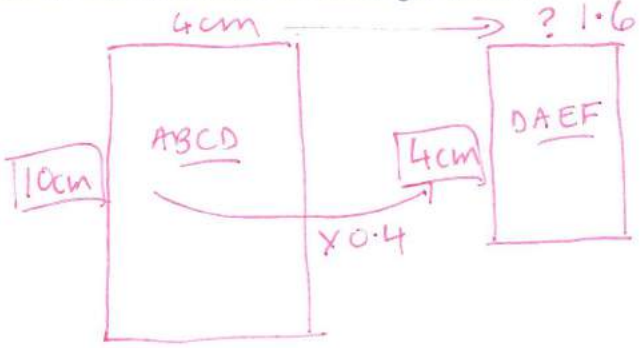
Q34



Rectangle *ABCD* is mathematically similar to rectangle *DAEF*

AB = 10 cm
AD = 4 cm

Work out the area of rectangle *DAEF*.

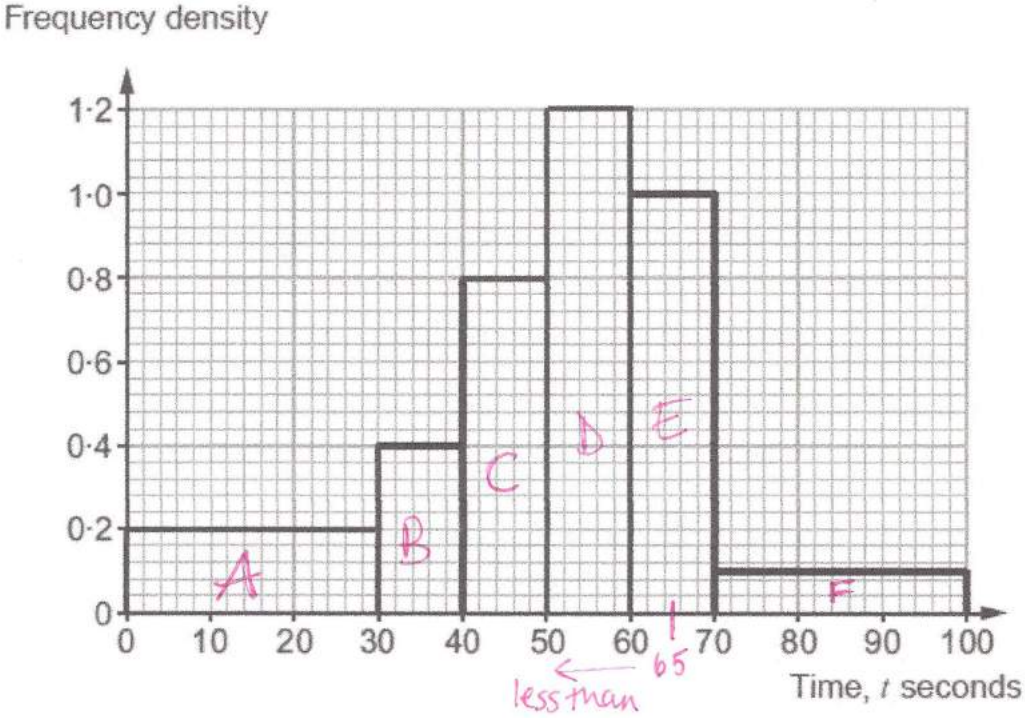


∴ Area of DAEF
= 4 × 1.6
= 6.4cm²

(4)

There are other ways!

Q36. The histogram shows the times taken by people in a group to answer 10 general knowledge questions.



a) Calculate the number of people in the group.

A = 30 × 0·2 = 6
B = 10 × 0·4 = 4
C = 10 × 0·8 = 8
D = 10 × 1·2 = 12
E = 10 × 1 = 10
F = 30 × 0·1 = 3

So total frequency = 43

(3)

a) Calculate an estimate for the number of people who answered the questions in less than 65 seconds.

1/2 of Block E = 5 people

A + B + C + D + 5 = 35

(2)

Q37. There are 200 workers at a factory. The cumulative frequency table gives information about their ages.

Age (a years)	Cumulative frequency
$0 < a \leqslant 20$	25
$0 < a \leqslant 30$	70
$0 < a \leqslant 40$	138
$0 < a \leqslant 50$	175
$0 < a \leqslant 60$	186
$0 < a \leqslant 70$	194
$0 < a \leqslant 80$	200

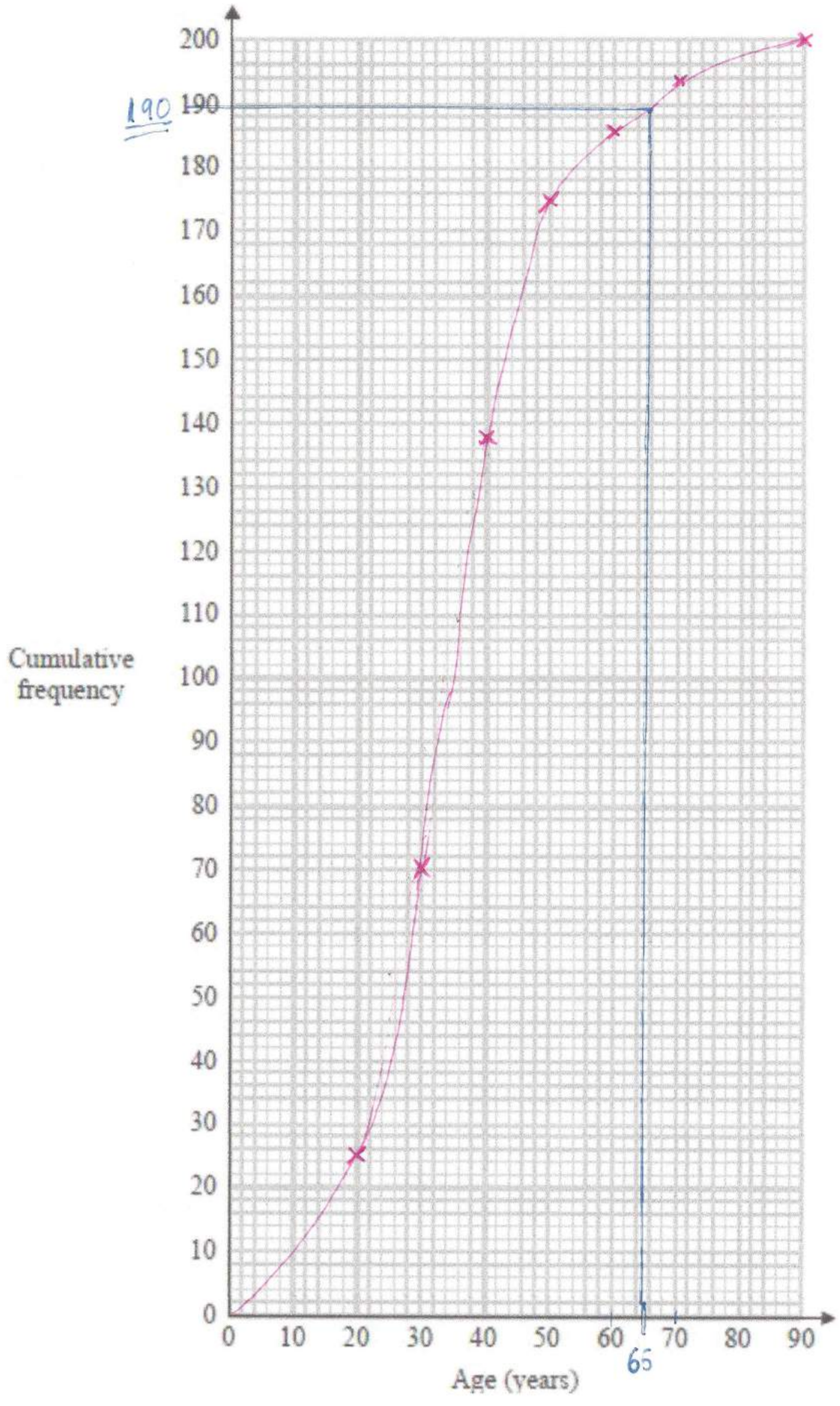
(a) On the grid opposite, draw a cumulative frequency graph for this information.

(2)

(b) Graham says: "10% of workers at the factory are older than 65"
Is Graham correct?
You must show how you get your answer.

10% of 200 is 20 workers
from the curve 10 workers are older than 65.
Graham is wrong – this is less than 10%

(2)



END OF QUESTIONS