CITY OF LONDON
FREEMEN'S SCHOOL

SAMPLE ENTRANCE EXAMINATION PAPER

For pupils currently in Year 9

MATHEMATICS

Time: 1 hour 30 minutes

Instructions

A calculator may be used throughout the examination.

Attempt ALL the questions. Show all your workings.

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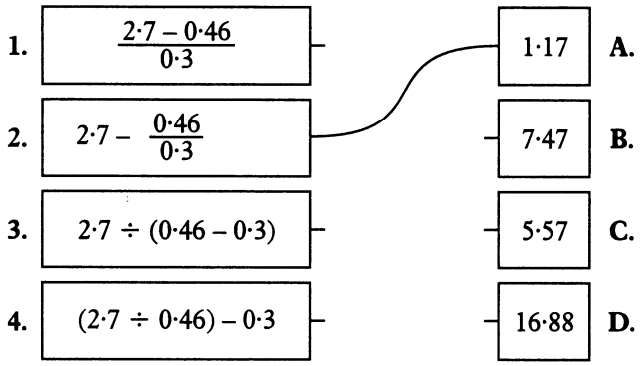
1. Match the questions to the correct answers.

The answers are written correct to two decimal places.



2. Use your calculator to solve problems a], b] and c], showing all necessary steps in your working.

a] Calculate the average speed in miles per hour of a journey of 36 miles which took 45 minutes.

Answer _____

b] A restaurant bill is £36 + Value-Added Tax at 17.5%.
Calculate the total bill after tax.

Answer _____

2. $$\frac{10.21 + 29.75}{0.2 \times 45}$$

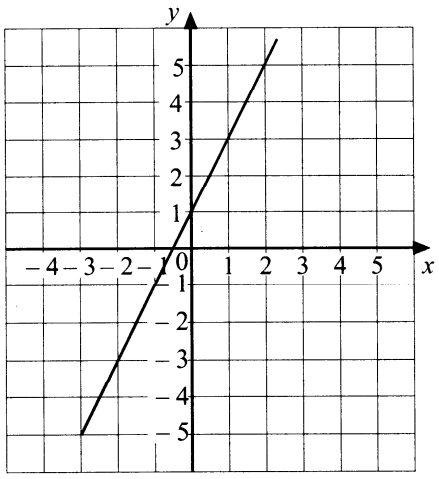
Show how you would **ESTIMATE** the answer, without using a calculator.
Write down your estimate. Then **CALCULATE** the answer.

Estimate _____

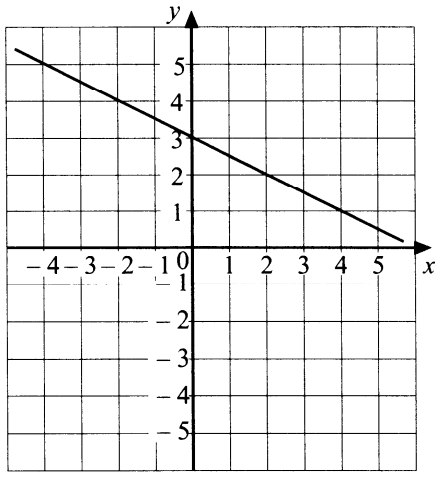
Answer _____

3. Determine the equation of each of the following lines:

(a)



(b)



(a) = _____

(b) = _____

4. a]

Leaded petrol	52.4p per litre
Unleaded petrol	49.6p per litre

I filled the petrol tank of my car with unleaded petrol. It cost me £18.60.

[i] How many litres did I buy?

Answer _____

[ii] How much more would it have cost me if I had bought leaded petrol instead?

Answer _____

b] Last year the amounts I spent on road tax, car insurance and petrol were in the ratio 1 : 3 : 7.

I spent a total of £1430 on these three items.

Calculate how much I spent on petrol.

Answer _____

5. a] Solve the equation

$$4y - 1 = 9 - y$$

$y =$ _____

b] Solve the equation

$$\frac{1}{2}x + 3 = 2$$

$x =$ _____

6. Dawn did a survey to find out where the members of Green Hills High School spent their main holiday last summer.

Her results are shown in the table below.

Destination	**Boys**	**Girls**	**Staff**	**Total**
Britain	107	120	20	247
France	48	40	.....	97
Greece	.....	36	3	.....
Rest of Europe	10	12	3	25
Other	10	6	5	.....
Total	200	.....	40	454

a] Complete the table.

b] How many girls went to France and Greece?

Ans. _____

c] What percentage of the staff went to Greece?

Ans. _____%

7. a] Write each of the following numbers as a product of its prime factors:

78, 240, 420

Answers 78 = _____

240 = _____

420 = _____

b] Find the Highest Common Factor (HCF) of 78 and 240.

Answer HCF = _____

c] Find the Lowest Common Multiple (LCM) of 240 and 420.

Answer LCM = _____

8. a] Write down the first five terms of the sequence with n^{th} term = ½ n^2.

Answer _____

b] Write an expression for the n^{th} term of the following sequence:

3, 5, 7, 9, 11

Answer n^{th} term = _____

9. Simplify the following expressions as far as possible:

a] $3a^2 + 5a^2$ = _____

b] $5y^4 \times 8y^7$ = _____

c] $4x^5 \div x^2$ = _____

d] $\left(a^2\right)^4$ = _____

10. If *n* can only take whole number values, find the set of values of *n* which satisfy the inequality

$-3 < n \leq 3$

Answer *n* =_____

11. Using a method of trial and improvement, find a solution to the following equation correct to 2 decimal places:

$x^2 - x = 10$ (Use x = 3 as your first guess and show all your working)

Answer _____

12. Solve the following pair of simultaneous equations:

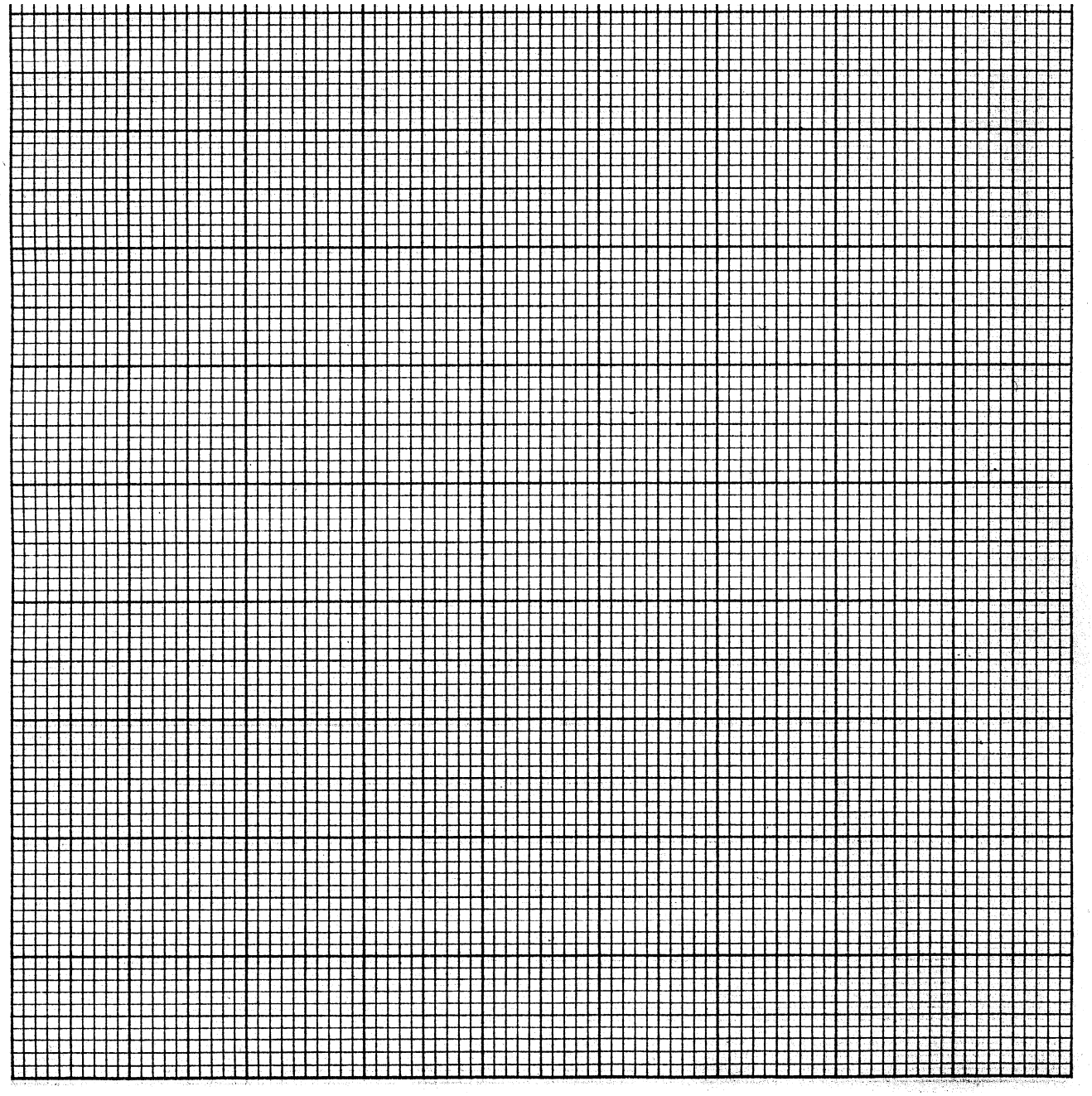
$a + 2b = 9$
$3a + b = 7$

Answers a = _____

b = _____

13. a] Draw a straight line graph on the grid below to convert temperatures between degrees Fahrenheit and degrees Celsius, given that:

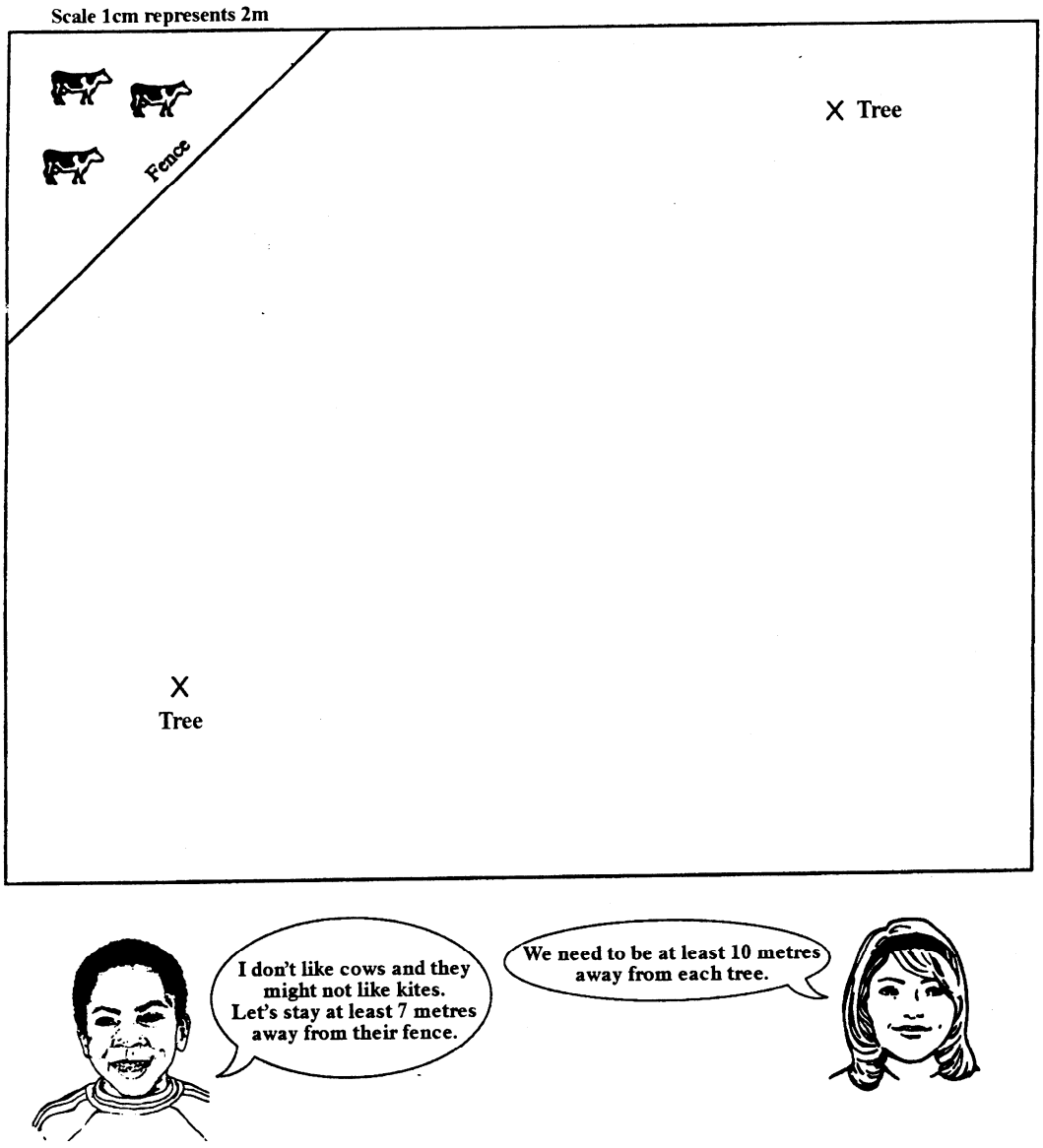
$0°C = 32°F$ and $100°C = 212°F$



b] Use your graph to complete the following conversions:

$60°C =$ _____ °F ; $170°F =$ _____ °C

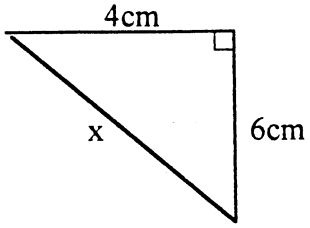
14.



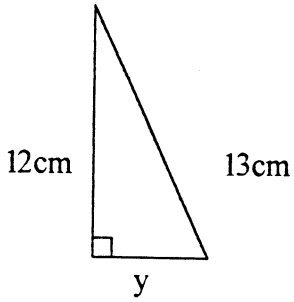
Shade on the diagram the area where they could stand to fly their kite.

15. Calculate the length of the side marked with a letter in each triangle, showing all your working.

a]

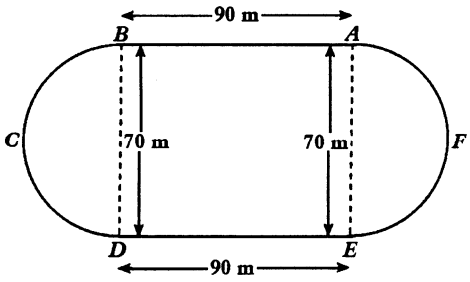


b]



Answers a] x = _____ b] y = _____

16.



The diagram shows a running track.

BA and DE are parallel and straight.

They are each of length 90 metres.

BCD and EFA are semi-circular.

They each have a diameter of length 70 metres.

a] Calculate the perimeter of the track.

Answer _____

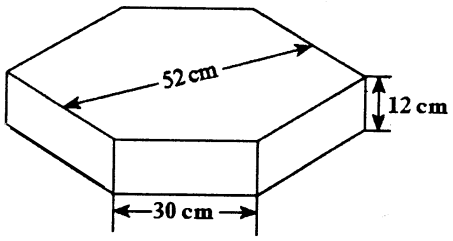
b] Calculate the total area inside the track.

Answer _____

16. c] Josie designs a possible box for a kite.

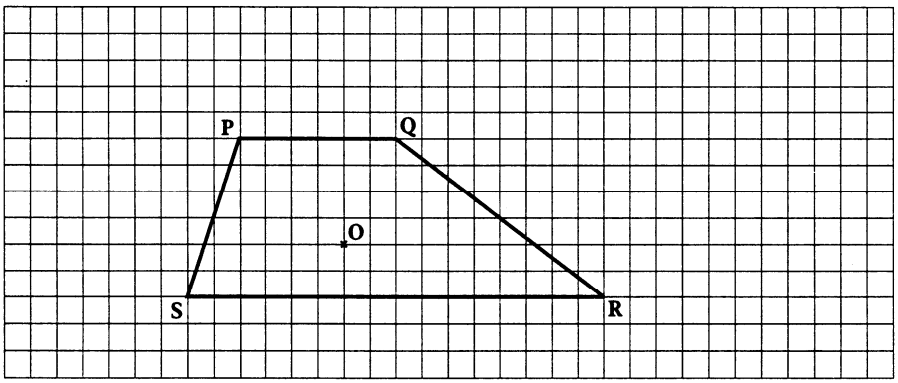
The box is a closed regular hexagonal prism.

Use the dimensions given to calculate the volume of this box.



Answer _____

17.



On the grid, enlarge the trapezium PQRS using a scale factor of ½.
Use the point O as the centre of the enlargement.

18. The examination marks of 250 pupils are recorded below. What was the mean mark?

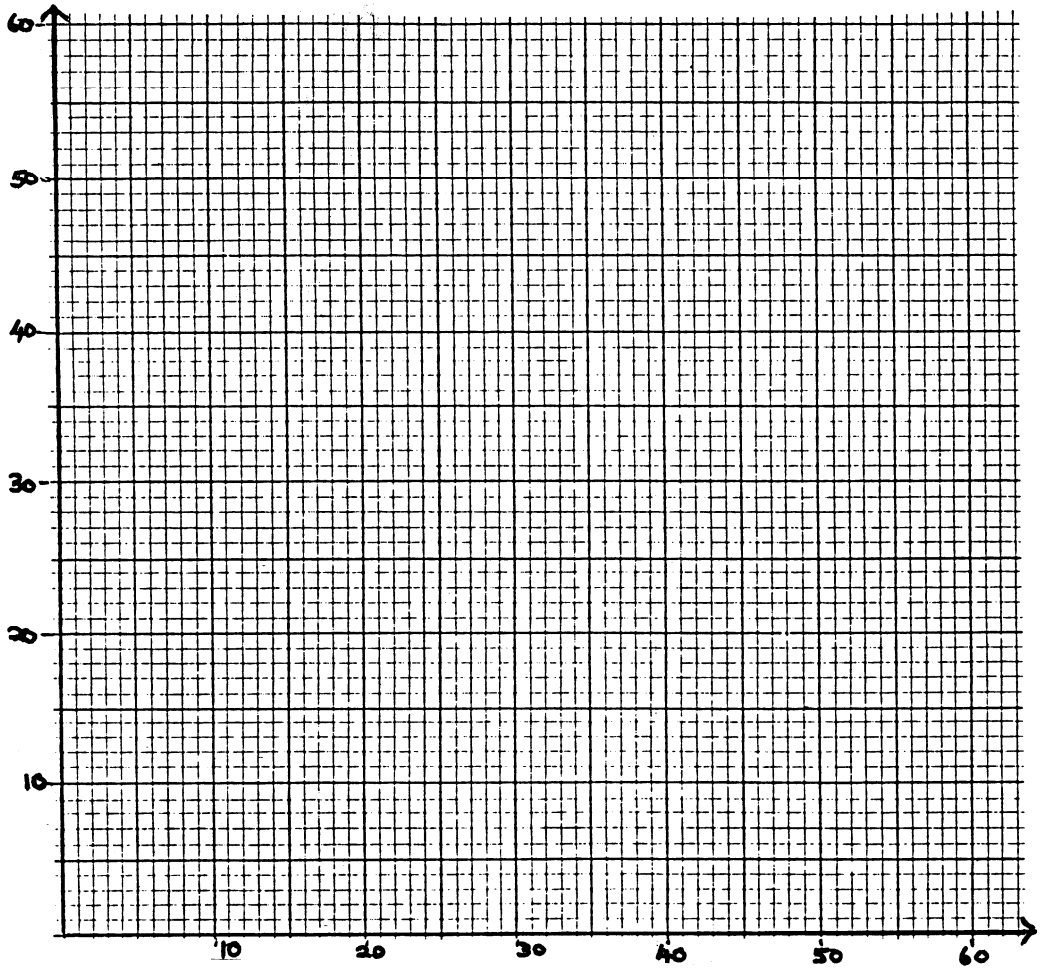
Class interval	0 - 9	10 - 19	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70 -79	80 - 89	90 - 99
Frequency f	0	2	6	24	36	47	55	40	27	13
Mid Point *x*										
f x *x*										

Answer Mean mark = _____

19. The table below shows Mathematics and Science marks for ten pupils:

Pupil	1	2	3	4	5	6	7	8	9	10
Maths	20	22	26	27	37	42	43	52	56	60
Science	25	26	22	30	40	45	48	58	52	48

a] Plot a scatter graph of the maths scores against the science scores for each pupil on the grid below:



b] Draw the line of best fit on your graph.

c] Use your graph to predict marks for Pupil A and Pupil B if:

Pupil A scores 10 for maths

Answer Predicted science mark for Pupil A = _____

and Pupil B scores 50 for science

Answer Predicted maths mark for Pupil B = _____

/Turn over

20. a] How many times would you expect to get a six if you rolled a fair dice 18 times?

Answer _____

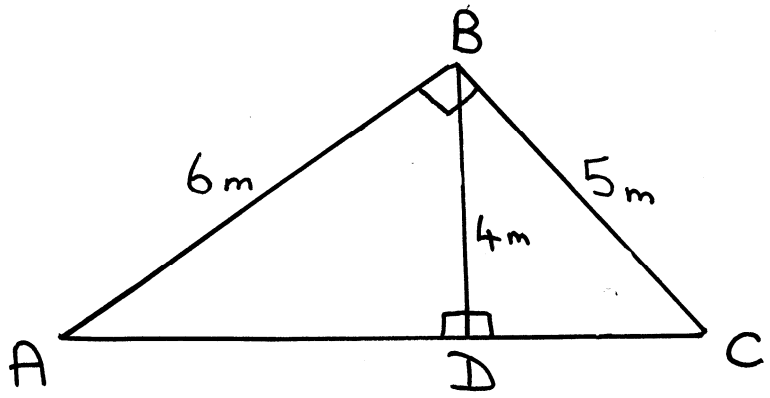
b] What is the probability of getting either a 1 or a 2 on one roll of a fair die?

Answer _____

c] If a pair of dice are rolled together, what is the probability of a **total** score of 8?

Answer _____

21.



a] Find the length of AD

Answer AD = _____

b] Find the length of DC.

Answer DC = _____

c] Hence find the area of Δ ABC.

Area of Δ ABC = _____