

THE G C SCHOOL OF CAREERS



MATHEMATICS DEPARTMENT SCHOOL YEAR 2019-2020

SAMPLE EXAMINATION PAPER FORM 2

<u>Name:</u>	
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INFORMATION TO CANDIDATES

Calculator is allowed.

Full marks may be obtained for answers to ALL questions.

This paper has **19** questions.

The total mark for this paper is 130.

ADVICE TO CANDIDATES

You must show sufficient working to make your methods clear to the examiner.

Answers without working may gain no credit.

1. (a) Make y the subject of the formula:

$$x = \sqrt{\frac{y-a}{y-b}}$$

(4 marks)

(b) Make x the subject of $\frac{3x^3}{2-m} + w = ap$

(4 marks)

2. Solve the following pair of simultaneous equations.

$$4x + 9y = -6$$

$$5x - 2y = 19$$

(5 marks)

3.

- (a) The point with coordinates $(q, 5)$ lies on the line $y = -3x + 2$.
Find the value of q .

(2 marks)

- (b) Find the value of k if the line $2y = (k - 3)x + 8$ is parallel to the line
 $y = -3x + 2$.

(3 marks)

4. The body mass index, B , for a person of mass m kg and height h metres is given by the formula

$$B = \frac{m}{h^2}$$

Usman has a mass of 50 kg.
He has a height of 1.57 m.

- a) Work out Usman's body mass index.

Give your answer correct to one decimal place.

(2 marks)

Tom's height is 1.80 m.
He wants his body mass index to be 21

- b) Work out the mass that will give Tom a body mass index of 21

(2 marks)

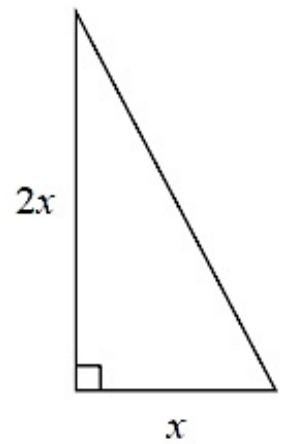
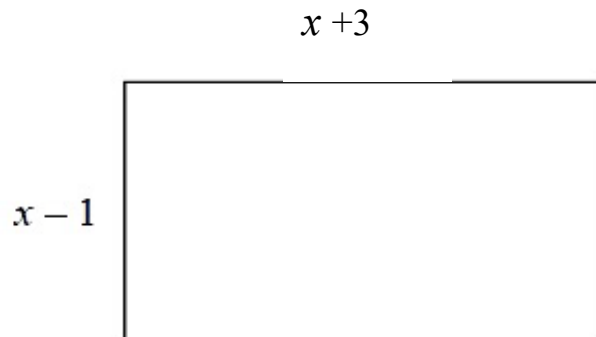
Tom is a ski jumper.

The maximum length of skis he can use is 145% of his height.
Tom's height is 1.80 m.

- c) Work out the maximum length of skis Tom can use.

(3 marks)

5. Here is a rectangle and a right-angled triangle.



(a) Show that the expression for the area of the rectangle is $x^2 - 3x + 2$

(2 marks)

All measurements are in centimetres.

The area of the rectangle is **greater** than the area of the triangle.

(b) Form an inequality and find the set of possible values of x .

(3 marks)

6. Use algebra to show that

$$0.3\dot{2}4 = \frac{107}{330}$$

(2 marks)

7. Factorise completely the following expressions:

(a) $12x^2 - 27x$

(2 marks)

(b) $a^2 - 2a - ax + 2x$

(4 marks)

8.

(a) Expand and simplify fully $(2x - 1)(x + 6) - (x - 4)^2$.

(8 marks)
























(b) Simplify fully $\frac{18a - 3ab}{6a^2}$.


(2 marks)

(c) Solve the equation $\frac{x}{12} + \frac{1}{3} = \frac{x}{4} - \frac{5}{6}$.

(3 marks)

9. In a survey, 1000 people in each of 6 countries were asked if they owned a computer.
The pictogram shows the results of the survey.

Greece	 
Hong Kong	      
Italy	   
Korea	    
Kuwait	  
Malaysia	 

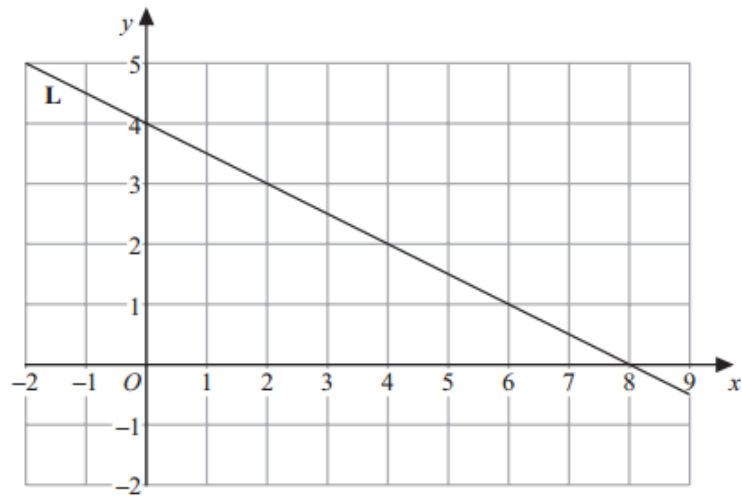
 represents 50 people who owned a computer.

- (a) In which country did the greatest number of people owned a computer?
- (b) Write down the number of people in Malaysia that owned a computer.
- (c) Write down the number of people in Italy that owned a computer.
- (d) In which country did 240 people owned a computer?

(4 marks)

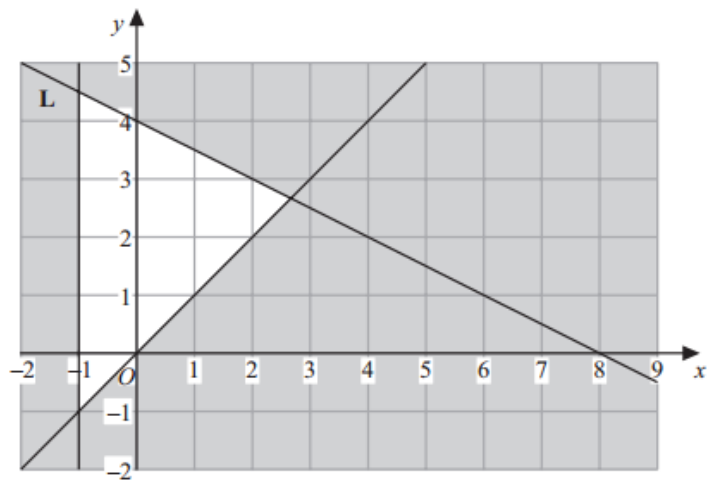
10.

(a) Find the equation of line **L**.



(3 marks)

(b) Write down the inequalities that define the unshaded region.



(3 marks)

11.(a) Find the gradient of the line $2x = -3y + 15$.

(3 marks)

(b) Find the midpoint of the points $(-1, -4)$ and $(9, 2)$.

(2 marks)

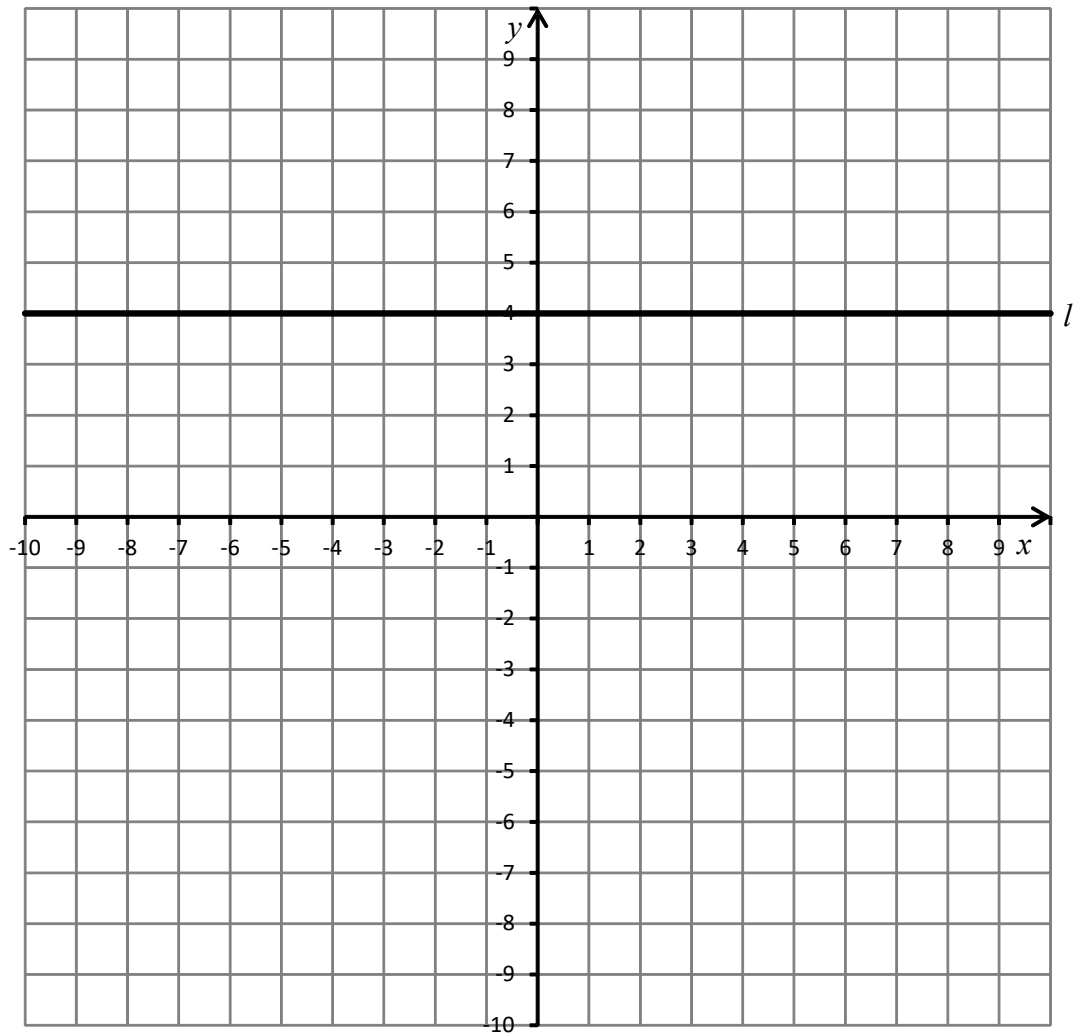
(c) Write down the equation of the line which is perpendicular to the line $2x = -3y + 15$ and passes through the midpoint of the points $(-1, -4)$ and $(9, 2)$.

(4 marks)

(d) Show that the distance between the point $(-1, -4)$ and the point $(9, 2)$ is $\sqrt{136}$.

(3 marks)

12.



(a) Write down the equation of line l .

(1 mark)

(b) On the diagram given above draw the line $y = -2x + 8$

(3 marks)

(c) Write down the coordinates of the point of intersection of line l and the line $y = -2x + 8$.

(1 mark)

13. Anna has more money than Bob.

If Anna gave Bob \$20, they would have the same amount of money.

If Bob gave Anna \$22, Anna would then have twice as much money as Bob. By forming two simultaneous equations find how much does each one have?

(5 marks)

14. A biased die was thrown a number of times. The number shown on the upper face was recorded each time. The results are summarised in the table. The total number of times the die is thrown is 78.

Number recorded	1	2	3	4	5	6
Frequency	12	24	x	4	7	10

Find:

(a) The value of x ,

(2 marks)

(b) The mean, giving your answer to 2 decimal places,

(3 marks)

(c) The median,

(2 marks)

(d) The range,

(1 mark)

15. The grouped frequency table gives information about the distance each of 150 people travel to work.

Distance travelled (d km)	Frequency
$0 < d \leq 5$	34
$5 < d \leq 10$	48
$10 < d \leq 15$	26
$15 < d \leq 20$	18
$20 < d \leq 25$	16
$25 < d \leq 30$	8

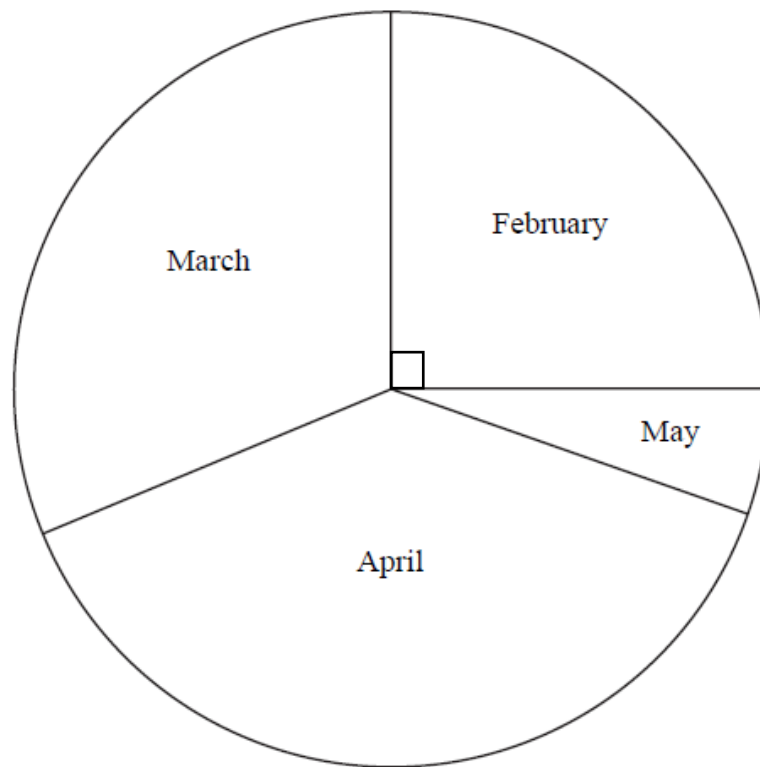
- (a) Work out an estimate for the mean distance travelled to work by the people.

(4 marks)

- (b) Work out what percentage of the 150 people travel more than 20 km to work.

(3 marks)

16. The pie chart shows information about the monthly profits made by a firm.



(a) In which month was the profit greatest?

(1 mark)

The total of the profits for the four months was £72 000.

(b) Work out the profit for February.

(2 marks)

(c) (i) Measure the angle for April.

(1 mark)

(ii) Calculate the profit for April.

(2 marks)

17.

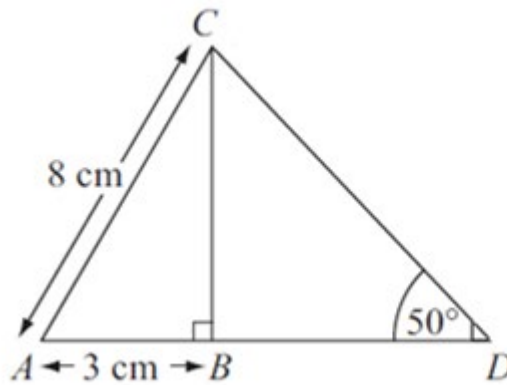


Diagram **NOT** accurately drawn

(a) Find the size of the angle CAB. Give your answer to 2 decimal places.

(3 marks)

(b) Find the length of CD. Give your answer correct to 3 significant figures.

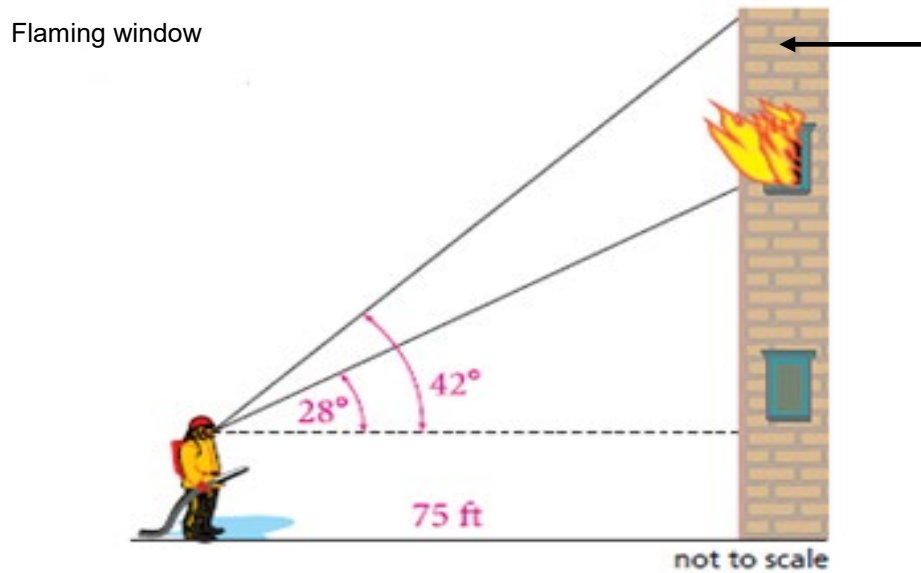
(5 marks)

18. A firefighter on the ground sees fire break through a window near the top of a building.

The angle of elevation from the firefighter to the window is 28° .

The angle of elevation from the firefighter to the top of the building is 42° .

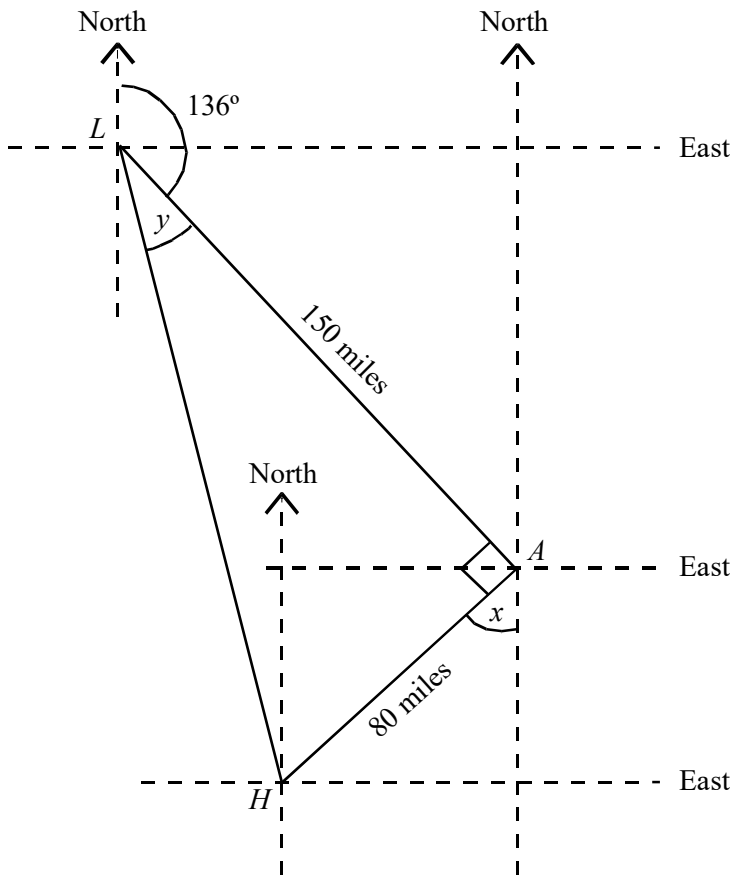
The firefighter stands 75 feet away from the building.



Find the vertical distance from the flaming window to the top of the roof.

(7 marks)

19. An airplane is flying from point L to point A and then from point A to point H .
 It flies 150 miles on a bearing of 136° from point L to a point A .
 It then turns through 90° and flies the final 80 miles to H .



The diagram is not drawn to scale

- (a) (i) Show clearly why the angle marked x is equal to 46° .

(2 marks)

- (ii) Find the bearing of H from A .

(2 marks)

- (b) Calculate the distance LH .

(1 mark)

- (c) (i) Calculate, to 1 decimal place the size of the angle marked y .

(3 marks)

- (ii) Find the bearing of L from H .

(3 marks)

THE END