



FOUNDED 1900

THE ENGLISH SCHOOL
A SECOND CENTURY OF EXCELLENCE

END-OF-YEAR-EXAMINATIONS

YEAR 3 MATHEMATICS MATHEMATICS A - IGCSE Book 1

Time allowed: 2 hours

Instructions to candidates

In the boxes below write your name, surname and form.
Answer the questions in the spaces provided.
Without sufficient working, correct answers may be awarded no marks.

Information to candidates

This paper has 26 questions.
There are 18 pages in this question paper.
Full marks may be obtained for answers to all questions.
The total marks for this paper is 130.
The marks for each question is shown in round brackets, e.g. (2)
Calculators may be used.

Advice for candidates

Write your answers neatly and in good English.
Work steadily through the paper.
Do not spend too long on one question.
Show all stages in any calculations.

Materials required for the paper

Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.
Tracing paper may be used.

1. (a) Mrs Green bought a car for £3000 and sold it for £3690. Determine the percentage profit she made, on the cost price.

.....
(2)

- (b) A new car is valued at £15000. At the end of each year its value is reduced by 15% of its value at the start of the year. What would it be worth after 6 years?

.....
(2)

- (c) The population of an island increases by 10% each year. After how many years will the original population be doubled?

.....
(1)

(Total 5 marks)

2. Dora, Ellen and Fiona contribute £2500, £1500 and £2000 respectively towards starting a small business.

- (a) Express the ratios of the amounts contributed in the order Dora : Ellen : Fiona, in the simplest possible form.

.....
(2)

- (b) Calculate the angles required on a pie chart to represent the investments made by these three women. Do not draw the pie chart.

.....
(2)

(Total 4 marks)

3. Solve the equations

(a) $5(y+2) - 3(y-2) = 4$

.....
(2)

(b) $\frac{5}{q} = 2$

.....
(1)

(c) $\sqrt{3x} = 4$

.....
(2)

(d) $\frac{x+3}{2} - \frac{x-2}{3} = 3$

.....
(3)

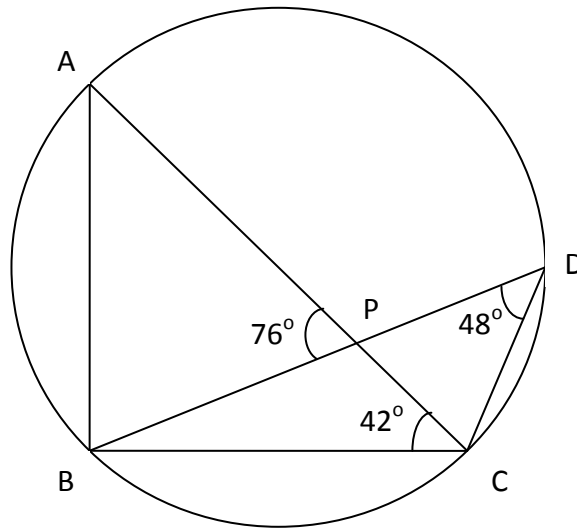
(Total 8 marks)

4. Solve the simultaneous equations

$$\begin{aligned} 2x &= 4 + y \\ 6x - 5y &= 18 \end{aligned}$$

.....
(Total 4 marks)

5.



In the above figure, chords AC and BD of a circle ABCD intersect at the point P.

$\angle APB = 76^\circ$, $\angle BCP = 42^\circ$ and $\angle CDB = 48^\circ$.

(a) (i) Find the size of angle BAC.

.....

(ii) Give a reason for your answer.

.....

(2)

(b) (i) Calculate the size of angle PBC.

.....

(ii) Give reasons for your answer.

.....

.....

(2)

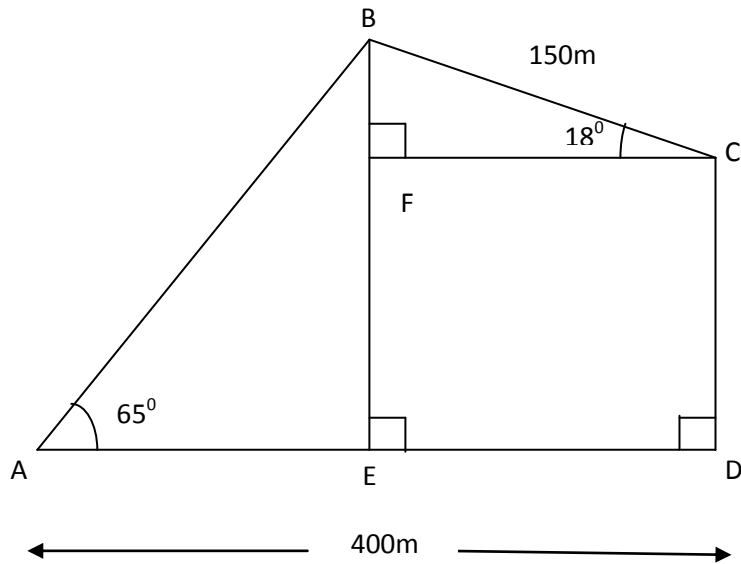
(c) Explain why AC is a diameter of the circle.

.....

(1)

(Total 5 marks)

6.



The above figure shows the plan of a field in the shape of a quadrilateral ABCD.

$BC = 150$ m, $AD = 400$ m and $\angle ADC = 90^\circ$.

The point E is on AD such that BE is perpendicular to AD and $\angle BAD = 65^\circ$.

The point F is on BE such that CF is perpendicular to BE and $\angle BCF = 18^\circ$.

Calculate the length, in m to 3 significant figures, of

(a) FC,

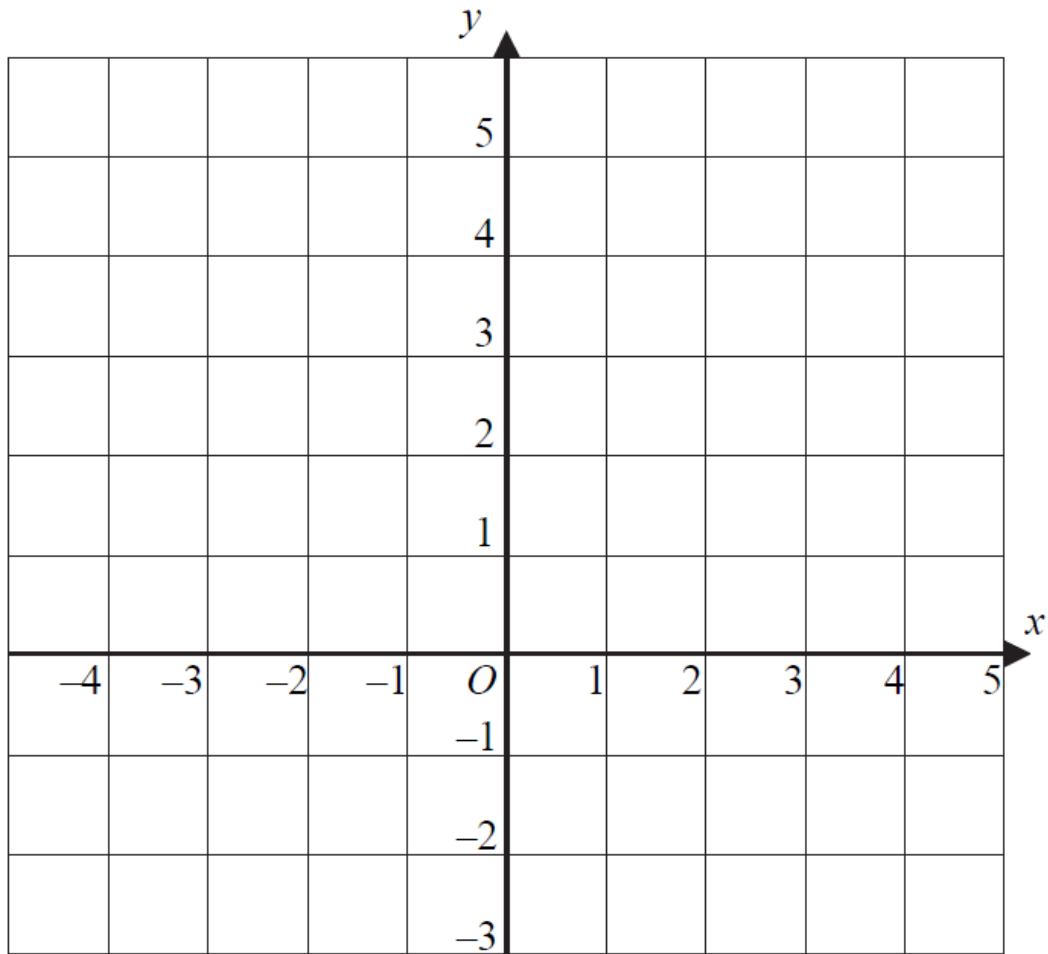
.....
(2)

(b) BE.

.....
(3)

(Total 5 marks)

7.



(a) On the grid, draw the lines $y = x + 1$ and $y = 3 - x$.

(2)

(b) On the grid, show clearly the region defined by the following inequalities by shading the wanted region.

$$x \geq 0$$

$$y \geq x + 1$$

$$y \leq 3 - x$$

(2)

(Total 4 marks)

8. Solve the inequality $4 - 2x < x - 17$.

.....

(Total 2 marks)

9. The size of each interior angle of a regular polygon exceeds the size of the exterior angle by 140° . Calculate the number of sides of the polygon.

.....

(Total 4 marks)

10. The price of a barrel of oil in US\$ on a particular day was \$22. The exchange rate on that day was $\text{£}1 = \$1.58$.

(a) Calculate the price, in £ to the nearest penny, of a barrel of oil on that day.

.....
(2)

A petroleum company bought 250000 barrels of oil on that day.

(b) Calculate the cost, in US\$, of the 250000 barrels, giving your answer in standard form.

.....
(2)

(Total 4 marks)

11. The marks of a group of examination candidates were distributed as shown below.

Mark	Frequency		
1-5	2		
6-10	3		
11-15	5		
16-20	8		
21-25	13		
26-30	17		
31-35	30		
36-40	25		
41-45	12		
46-50	9		
51-55	5		
56-60	1		

(a) Calculate the total number of candidates.

.....
(2)

(b) By completing the table above, calculate an estimate of the mean mark.

.....
(3)

(c) Find the modal class.

.....
(1)

(Total 6 marks)

12. (a) Expand and simplify

$$(x^2 + 4x - 2)(x - 5)$$

.....
(2)

(b) Factorise fully

$$24 - 5x - x^2$$

.....
(3)

(Total 5 marks)

13. $\mathcal{E} = \{\text{positive integers less than 12}\}$,

$$A = \{1, 2, 3, 4, 5\}, B = \{2, 4, 6, 7, 9\}, C = \{1, 4, 5, 7, 8\}$$

(a) Illustrate the above sets on a Venn Diagram and put all elements in their appropriate regions.

(2)

List all the elements of the following sets:

(b) $A \cap B'$

.....
(1)

(c) $A \cap B \cap C'$

.....
(1)

(d) $(A \cup C)'$

.....
(1)

(Total 5 marks)

14. Simplify fully

$$\frac{x^2 + 3x - 10}{x^2 - 9} \div \frac{x + 5}{x^2 + 3x}$$

.....

(Total 4 marks)

15. (a) Write as single powers of x

(i) $x^6 \times x^{-2}$

.....
(1)

(ii) $x^8 \div x^{-4}$

.....
(1)

(b) Simplify the following expressions

(i) $(3x^2y)^3$

.....
(2)

(ii) $\left(\frac{x^2}{4}\right)^2$

.....
(2)

(Total 6 marks)

16. $y = \frac{3x+1}{x+2}$

(a) Make x the subject.

..... (3)

(b) Find y when $x = 13$.

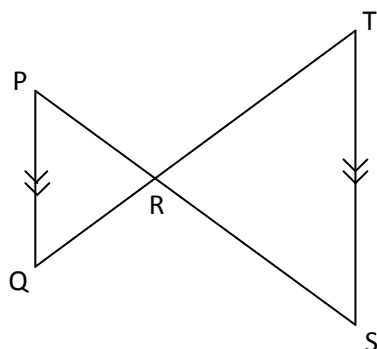
..... (1)

(c) Find x when $y = 2$.

..... (2)

(Total 6 marks)

17.



(a) Prove that $\triangle PQR$ and $\triangle RTS$ are similar.

(2)

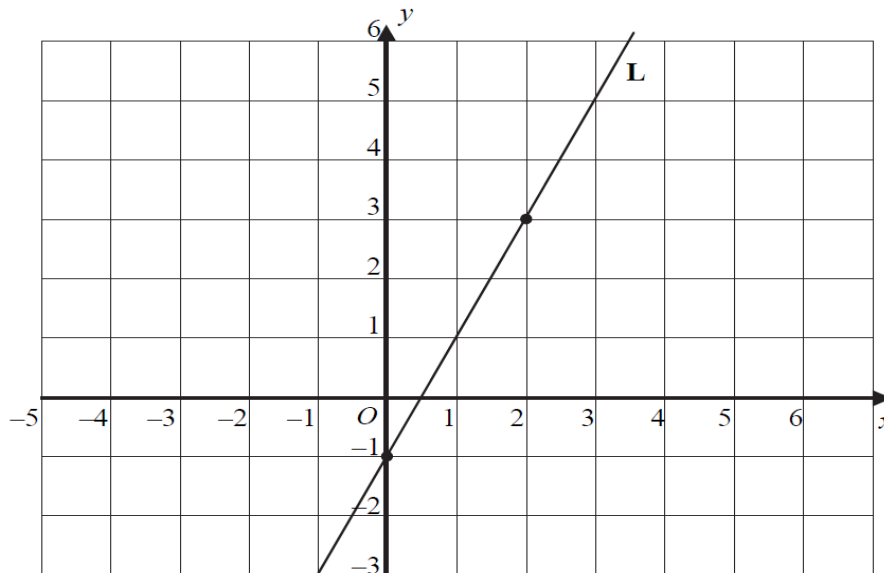
QP = 4 cm, PR = 3 cm, QR = 2 cm and ST = 10 cm.

(b) Find PS.

..... (3)

(Total 5 marks)

18. The straight line, L, passes through the points (0, -1) and (2, 3).



(a) Work out the gradient of the L.

.....
(2)

(b) Write down the equation of L.

.....
(2)

(c) Write down the equation of another line that is parallel to L.

.....
(1)

(Total 5 marks)

19. Express the following recurring decimals as exact fractions:

(a) $0.\dot{7}$

.....
(1)

(b) $0.2\dot{8}$

.....
(2)

(Total 3 marks)

20. The n th term of a sequence is given by this formula.

$$n\text{th term} = 20 - 3n$$

(a) Work out the 8th term of the sequence.

.....
(2)

(b) Find the value of n for which the n th term equals -22 .

.....
(2)

(c) Here are the first five terms of a different sequence.

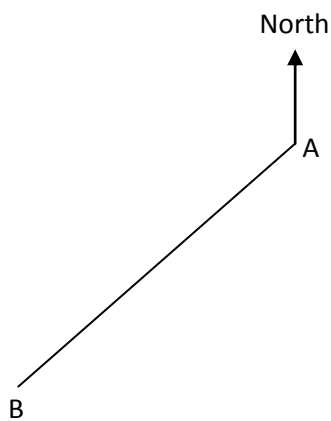
8 11 14 17 20

Find a formula, in terms of n , for the n th term of this sequence.

.....
(2)

(Total 6 marks)

21. The diagram shows two towns, A and B.



(a) Measure the bearing of B from A.

.....
(1)

(b) A plane flies along the perpendicular bisector of AB.

Use ruler and compasses to construct the perpendicular bisector of AB.

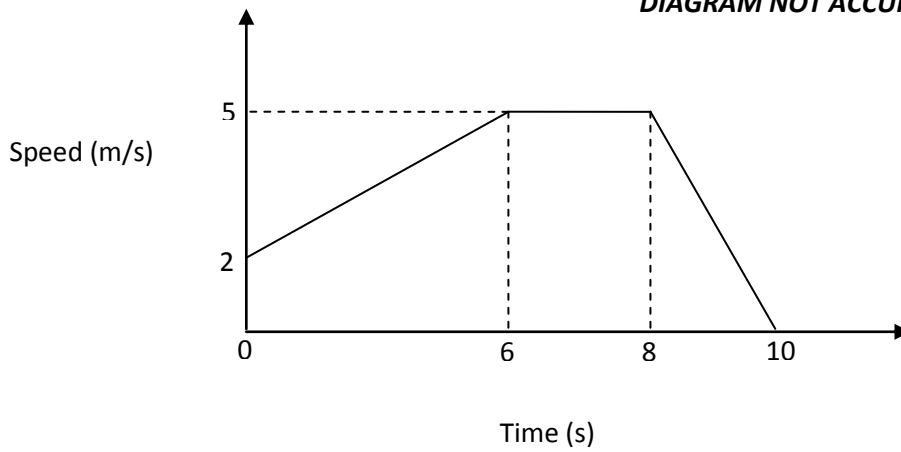
Show all your construction lines clearly.

(2)

(Total 3 marks)

22.

DIAGRAM NOT ACCURATELY DRAWN



(a) Find the acceleration during the first 6 seconds.

.....
(2)

(b) Find the retardation during the final 2 seconds.

.....
(2)

(c) Find the total distance travelled.

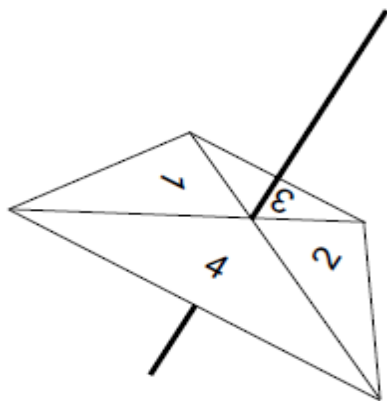
.....
(2)

(d) Find the mean speed of the journey in metres per second.

.....
(2)

(Total 8 marks)

23. Here is a spinner with four faces.



Its faces are labelled 1, 2, 3 and 4.

The spinner is biased.

The probability that the spinner lands on each of the numbers 1, 2 and 3 is given in the table.

Number	Probability
1	0.25
2	0.25
3	0.1
4	

The spinner is spun once.

(a) Work out the probability that the spinner lands on 4.

.....
(1)

(b) Work out the probability that the spinner lands on either 2 or 3.

.....
(1)

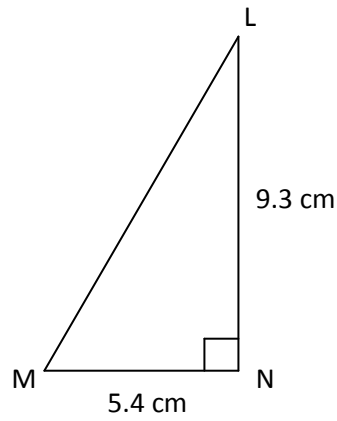
The spinner is spun 50 times.

(c) Calculate the expected number of times that the spinner lands on 3.

.....
(2)

(Total 4 marks)

24.



Triangle LMN is right-angled at N.

MN = 5.4 cm and LN = 9.3 cm.

- (a) Work out the size of angle LMN.
Give your answer correct to 1 decimal place.

.....
(2)

The length, 5.4 cm, of MN and the length, 9.3 cm, of LN, are each correct to 2 significant figures.

- (b) (i) Write down the lower and upper bounds of the length of LN.

.....
(1)

- (ii) Write down the lower and upper bounds of the length of MN.

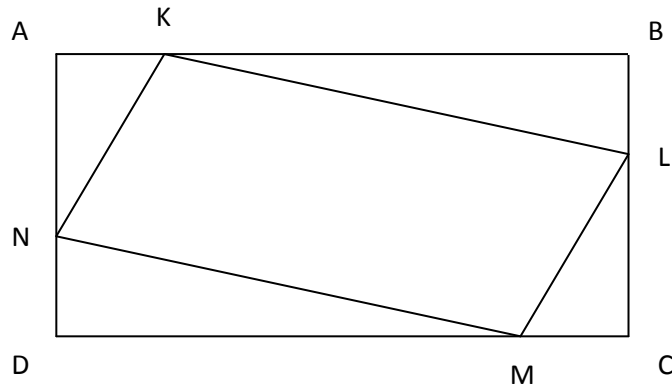
.....
(1)

- (c) Find the upper bound for $\tan(\angle LMN)$.
Give your answer correct to 2 significant figures.

.....
(1)

(Total 5 marks)

25.



In the figure above, ABCD is a rectangle with $AB = 12$ cm and $BC = 8$ cm.
 $AK = BL = CM = DN = x$ cm.

The area of quadrilateral KLMN is 54 cm².

(a) Show that $x^2 - 10x + 21 = 0$

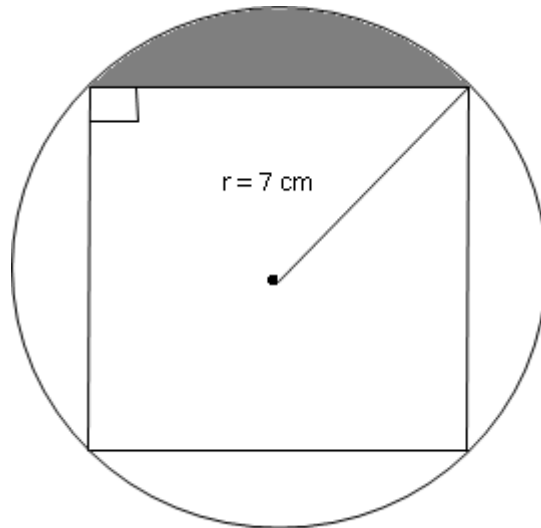
.....
(4)

(b) Solve the equation $x^2 - 10x + 21 = 0$ to find the possible values of x .

.....
(3)

(Total 7 marks)

26.



A square is inscribed in a circle of radius 7 cm.

(a) Write down the length of the diagonal of the square.

.....
(1)

Find:

(b) the length of the side of the square, in cm, correct to 1 decimal place.

.....
(3)

(c) the area of the square, in cm^2 .

.....
(1)

(d) the area of the shaded region, in cm^2 , correct to 1 decimal place.

.....
(2)

(Total 7 marks)

– THE END –