

Centre Number	Candidate Number	Name
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UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

MATHEMATICS (SYLLABUS D)

4024/01

Paper 1

May/June 2006

2 hours

Candidates answer on the Question Paper.
Additional Materials: Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
The number of marks is given in brackets [] at the end of each question or part question.

If working is needed for any question it must be shown in the space below that question.
Omission of essential working will result in loss of marks.
The total of the marks for this paper is 80.

NEITHER ELECTRONIC CALCULATORS NOR MATHEMATICAL TABLES MAY BE USED IN THIS PAPER.

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**NEITHER ELECTRONIC CALCULATORS NOR MATHEMATICAL TABLES
MAY BE USED IN THIS PAPER.**

- 1** **(a)** Express 0.527 as a percentage.
(b) Evaluate $5.6 \div 0.08$.

Answer (a) % [1]

(b) [1]

- 2** Evaluate

(a) $\frac{6}{7} - \frac{1}{3}$,

(b) $\frac{2}{5} \times \frac{4}{9}$.

Answer (a) [1]

(b) [1]

- 3** The rate of exchange between pounds (£) and dollars (\$) was £1 = \$2.80.

Calculate

- (a)** the number of dollars received in exchange for £120,
(b) the number of pounds received in exchange for \$224.

Answer (a) \$ [1]

(b) £ [1]

- 4 Complete the statements in the answer spaces.

Answer (a) 4872 correct to 1 significant figure is [1]

(b) 4872 correct to significant figures is 4870. [1]

- 5 (a) A journey of 170 kilometres took $4\frac{1}{4}$ hours.
Calculate the average speed in kilometres per hour.
- (b) Potatoes cost 75 cents per kilogram.
John paid \$1.20 for a bag of potatoes.
How many kilograms did he buy?

Answer (a) km/h [1]

(b) kg [1]

- 6 It is given that $p = \frac{12}{\sqrt{q}}$.

- (a) Describe the relationship between p and q in words by completing the sentence in the answer space.
- (b) Calculate q when $p = 4$.

Answer (a) p is proportional to the square root of q . [1]

(b) $q =$ [1]

- 7 A dealer sold a painting for \$800.
She made a profit of 25% on the price she paid for it.
Calculate the price she paid for the painting.

Answer \$[2]

- 8 (a) The time difference between Brunei and London is 7 hours.
So, when it is 19 00 in Brunei, it is 12 00 in London.
When it is 03 30 in Brunei, what time is it in London?
- (b) An aircraft leaves Brunei at 6 30 p.m. local time.
It arrives in Dubai at 10 p.m. local time.
The flight took $7\frac{1}{2}$ hours.
Calculate the time difference between Dubai and Brunei.

Answer (a)[1]

(b)hours [1]

- 9 The thickness of an oil film is 0.000 004 cm.
- (a) Express 0.000 004 in standard form.
- (b) The oil covers an area of 20 m^2 .
Calculate the volume of the oil in cubic centimetres.

Answer (a)[1]

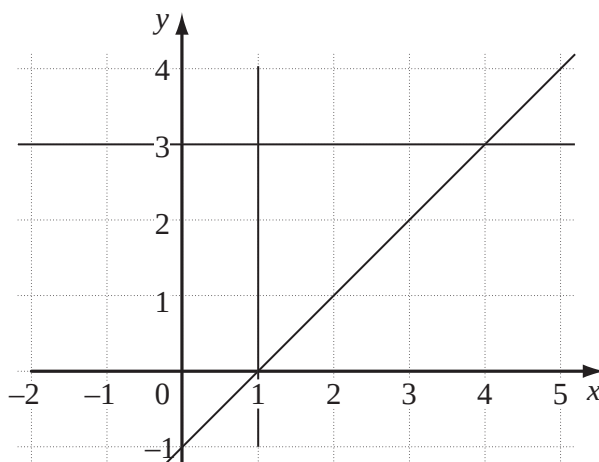
(b) cm^3 [2]

- 10 (a) (i) Find the smallest integer k which satisfies $7k \geq 36$.
- (ii) Find the largest integer n which satisfies $3n - 1 < 26$.

Answer (a)(i) smallest $k = \dots\dots\dots[1]$

(ii) largest $n = \dots\dots\dots[1]$

(b)



The diagram shows the graphs of $x = 1$, $y = 3$ and $y = x - 1$.

The region, **R**, is defined by the inequalities $x > 1$, $y < 3$ and $y > x - 1$.

Given that the point (x, y) is in the region **R**, find the integer values of x and y .

Answer (b) $x = \dots\dots\dots y = \dots\dots\dots[1]$

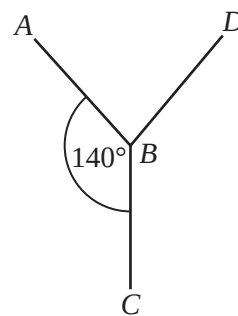
- 11 Solve the simultaneous equations

$$\begin{aligned} 3x &= 7y, \\ 12y &= 5x - 1. \end{aligned}$$

Answer $x = \dots\dots\dots$

$y = \dots\dots\dots[3]$

- 12 AB and BC are adjacent sides of a regular polygon.
 $\hat{ABC} = 140^\circ$.



- (a) Calculate the number of sides of the polygon.
- (b) CB and BD are adjacent sides of a congruent regular polygon.
Calculate $\hat{ABD}$.

Answer (a)[2]

(b) $\hat{ABD} =$ [1]

- 13 (a) Evaluate $5^2 + 5^0$.

- (b) Simplify

(i) $\left(\frac{1}{x}\right)^{-2}$,

(ii) $\left(x^6\right)^{\frac{1}{2}}$.

Answer (a)[1]

(b)(i) [1]

(ii) [1]

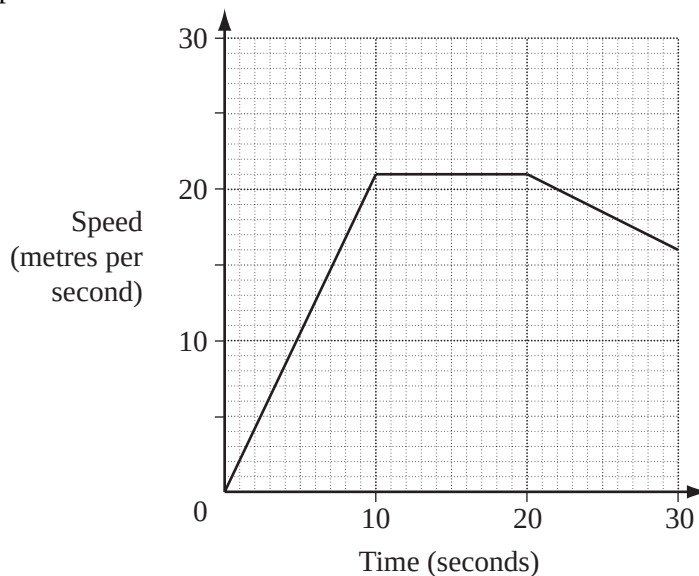
- 14 (a) $f(x) = (x + 2)(2x - 1)$.
Evaluate $f(5.5)$.

- (b) $g(x) = \frac{1}{3}(2x - 1)$.
Find $g^{-1}(5)$.

Answer (a) $f(5.5) =$ [1]

(b) $g^{-1}(5) =$ [2]

- 15** A cyclist took 30 seconds to ride from A to B.
The diagram is the speed-time graph of his ride.



Calculate

- (a)** the distance from A to B,
(b) his retardation during the final 10 seconds.

Answer (a) m [2]

(b) m/s^2 [1]

- 16 (a)** A prism has a cross-section which is a regular hexagon.
How many planes of symmetry does this prism have?

Answer (a) [1]

- (b)** The length and width of a rectangle are 50 cm and 15 cm respectively.
Each measurement is correct to the nearest centimetre.

- (i)** Write down the upper bound of the length.
(ii) Find the least possible perimeter of the rectangle.

Answer (b)(i) cm [1]

(ii) cm [1]

- 17 (a) Given that $x = 6$ is a solution of $\frac{x^2}{3} + k = 0$, find the value of k .
- (b) Solve $2y^2 - 3y - 2 = 0$.

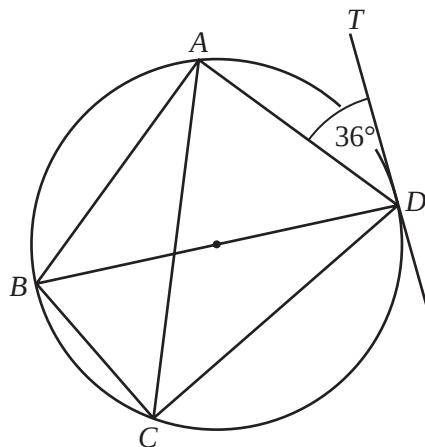
Answer (a) $k = \dots\dots\dots$ [1]

(b) $y = \dots\dots\dots$ or $\dots\dots\dots$ [2]

- 18 A, B, C and D are points on a circle with BD as diameter.
 TD is a tangent at D and $\angle TDA = 36^\circ$.

Find

- (a) $\angle ADB$,
(b) $\angle ABD$,
(c) $\angle ACD$.



Answer (a) $\angle ADB = \dots\dots\dots$ [1]

(b) $\angle ABD = \dots\dots\dots$ [1]

(c) $\angle ACD = \dots\dots\dots$ [1]

19 $C = \frac{5}{9}(F - 32)$

(a) Calculate C when $F = -4$.

(b) Express F in terms of C .

Answer (a) $C = \dots\dots\dots[1]$

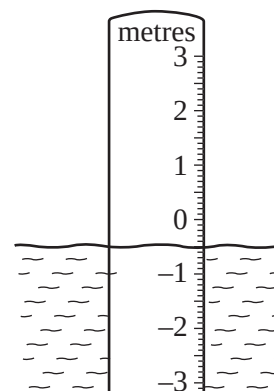
(b) $F = \dots\dots\dots[2]$

- 20** The diagram shows a gauge for measuring the water level in a reservoir.
Readings, in metres, taken over a certain period were as follows:

$-2.3, -1.6, -0.4, 0.1, -0.5, 0.3, -1.2$.

For these readings

- (a)** find the difference, in metres, between the highest and lowest levels,
(b) find the median,
(c) calculate the mean.

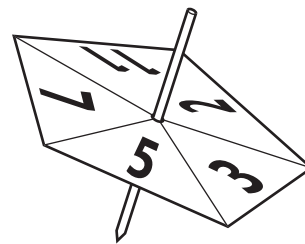


Answer (a) $\dots\dots\dots$ m [1]

(b) $\dots\dots\dots$ m [1]

(c) $\dots\dots\dots$ m [2]

- 21** A fair five-sided spinner is numbered using the prime numbers 2, 3, 5, 7 and 11.



- (a)** In a game, players spin it twice and add the two numbers obtained.

- (i)** Complete the possibility diagram.

Answer (a)(i)

+	2	3	5	7	11
2	4	5			
3					
5			10	12	
7			12		
11					

[1]

- (ii)** Find the probability that the total of the two numbers is

(a) a prime number,

(b) a perfect square.

Answer (a)(ii)(a)[1]

(b)[1]

- (b)** In another game, players spin it twice and multiply the two numbers obtained. Without drawing another possibility diagram, write down the probability that this product is a prime number.

Answer (b)[1]

- 22 A map is drawn using a scale of 1 cm to 5 m.
The position of A is shown in the answer space below.

- (a) The point B is 70 m due East of A .
Draw the line representing AB .
- (b) The point C is North of AB and equidistant from A and B .

Angle $BAC = 40^\circ$.

- (i) By drawing appropriate lines, find and label the point C .
(ii) Find the actual distance AC .
(iii) State the size of the reflex angle BAC .

Answer (a) and (b)(i)



[3]

Answer (b)(ii) m [1]

(iii) reflex $\hat{BAC} = \dots\dots\dots$ [1]

23 (a) Simplify

(i) $x(3x + 2) - (2x + 4),$

(ii) $\frac{ax^2 - x^2}{ax - x}.$

(b) Factorise completely $7x^2 - 63.$

Answer (a)(i)[1]

(ii)[2]

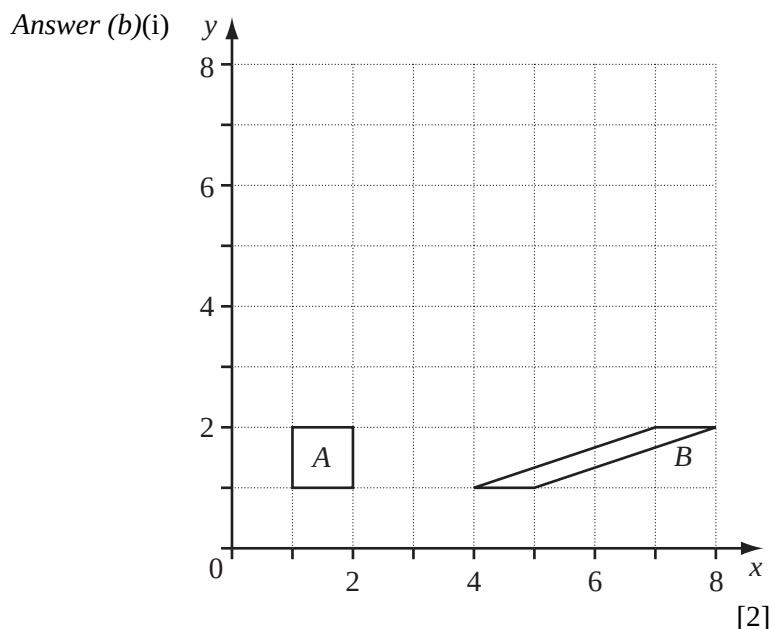
(b)[2]

- 24 (a)** Under the transformation T , the origin is invariant.
 T maps $(1, 0)$ onto $(2, 0)$ and $(0, 1)$ onto $(0, 2)$.
- (i)** Find the matrix that represents T .
- (ii)** Describe, fully, the **single** transformation T .

Answer (a)(i) $\left(\begin{array}{cc} & \\ & \end{array} \right)$ [1]

Answer (a)(ii)[1]

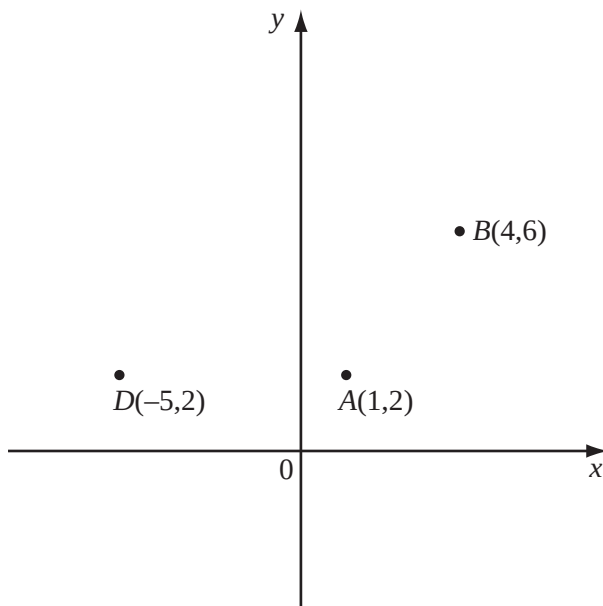
- (b)** The diagram shows shapes A and B .



- (i)** Shape B is mapped onto shape C by a rotation, centre $(8, 3)$, through 90° clockwise.
 Draw shape C on the diagram.
- (ii)** Describe, fully, the **single** transformation that maps A onto B .

Answer (b)(ii)[2]

- 25 The diagram shows the points $A(1, 2)$, $B(4, 6)$ and $D(-5, 2)$.



- (a) Find the coordinates of the midpoint of AB .
- (b) Calculate the length of AB .
- (c) Calculate the gradient of the line AB .
- (d) Find the equation of the line AB .
- (e) The triangle ABC has line of symmetry $x = 4$. Find the coordinates of C .
- (f) Find the value of cosine $\hat{DAB}$.

Answer (a) (.....,) [1]

(b) [1]

(c) [1]

(d) [2]

(e) (.....,) [1]

(f) $\cos \hat{DAB} = \dots\dots\dots$ [1]

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