

Grade IX

CANDIDATE
NAME

CENTRE
NUMBER

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CANDIDATE
NUMBER

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MATHEMATICS (SYLLABUS D)

4024/02

Paper 2 Calculator

First Term
1 hr30min

SPECIMEN PAPER

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a scientific calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π , use either your calculator value or 3.142.

INFORMATION

- The total mark for this paper is 100.
- The number of marks for each question or part question is shown in brackets [].



List of formulas

Area, A , of triangle, base b , height h .

$$A = \frac{1}{2}bh$$

Area, A , of circle of radius r .

$$A = \pi r^2$$

Circumference, C , of circle of radius r .

$$C = 2\pi r$$

Curved surface area, A , of cylinder of radius r , height h .

$$A = 2\pi rh$$

Curved surface area, A , of cone of radius r , sloping edge l .

$$A = \pi rl$$

Surface area, A , of sphere of radius r .

$$A = 4\pi r^2$$

Volume, V , of prism, cross-sectional area A , length l .

$$V = Al$$

Volume, V , of pyramid, base area A , height h .

$$V = \frac{1}{3}Ah$$

Volume, V , of cylinder of radius r , height h .

$$V = \pi r^2 h$$

Volume, V , of cone of radius r , height h .

$$V = \frac{1}{3}\pi r^2 h$$

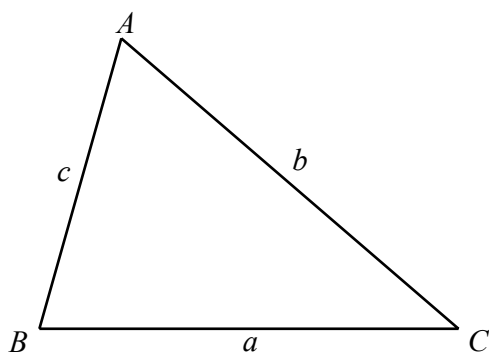
Volume, V , of sphere of radius r .

$$V = \frac{4}{3}\pi r^3$$

For the equation $ax^2 + bx + c = 0$, where $a \neq 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

For the triangle shown,



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{Area} = \frac{1}{2}ab \sin C$$

1 (a) $p = \frac{3q+5}{r^2}$

Calculate p when $q = 15$ and $r = -4$.

$p = \dots\dots\dots$ [2]

(b) Expand and simplify $3(2x+1)+4(x-5)$.

$\dots\dots\dots$ [2]

(c) Solve $\frac{3-k}{4} = 1$.

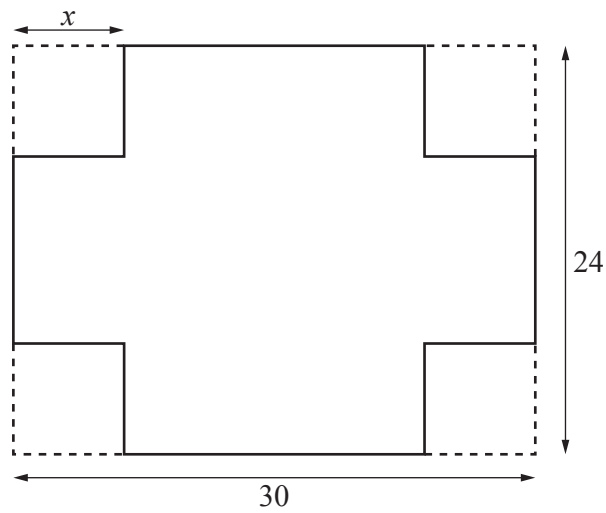
$k = \dots\dots\dots$ [2]

(d) $\frac{x^6}{x^m} = x^{-3}$

Find m .

$m = \dots\dots\dots$ [1]

(e)

NOT TO
SCALE

A rectangular piece of card measures 30 cm by 24 cm.
 The net of an open box is made by removing a square from each corner of this piece of card.
 Each square that is removed has side x cm.
 The area of the net is 576 cm^2 .

- (i) Form an equation in x and solve it to find the value of x .

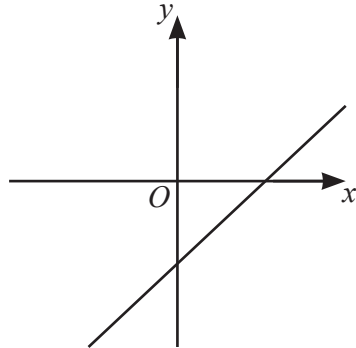
$$x =$$

[3]

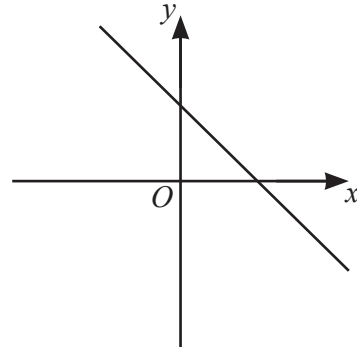
2 (a) $y = 2x + 1$ $y = 2x - 1$ $y = -2x + 1$ $y = -2x - 1$

The diagrams below show sketches of two of these lines.

Write the correct equation below each diagram.



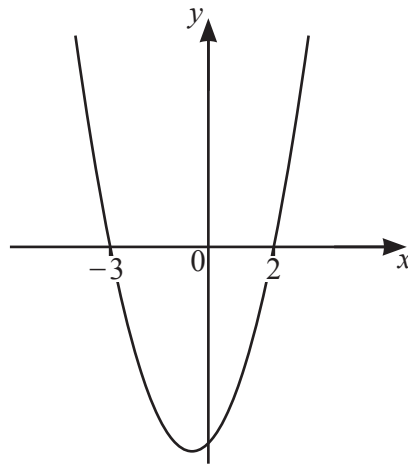
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.....

[2]

(b)



This diagram shows a sketch of the graph of $y = x^2 + ax + b$.

Find the value of a and the value of b .

$a = \dots\dots\dots b = \dots\dots\dots$ [2]

- 3** (a) Factorise $25t^2 - 4$.

Answer [1]

- (b) Factorise $x^2 - 6x - 3xy + 18y$.

Answer [2]

- 4** A rectangle has length 64 mm and width 37 mm each correct to the nearest millimetre.

- (a) Write down the lower bound for the length.

Answer mm [1]

- (b) Calculate the lower bound for the perimeter of the rectangle.

Answer mm [1]

5 The area of a rectangle is given as 8 cm^2 , correct to the nearest cm^2 .

(a) Write down the lower bound for the area of the rectangle.

Answer cm^2 [1]

(b) The width of the rectangle is given as 2 cm , correct to the nearest cm .

Calculate the lower bound for the length of the rectangle.

Answer cm [1]

6 By making suitable approximations, calculate an estimate for $\frac{40.32 \times \sqrt{35.7}}{2980}$.

Show **clearly** the approximations you use and give your answer correct to 1 significant figure.

Answer [2]

- 7 P is the point $(-2, 1)$ and Q is the point $(6, 13)$.
 M is the midpoint of the line PQ .

(a) Find the coordinates of M .

(..... ,) [1]

(b) (i) Find the gradient of the line PQ .

..... [2]

(ii) Write down the gradient of a line that is perpendicular to the line PQ .

..... [1]

8 P is the point $(3, -3)$ and Q is the point $(1, 5)$.

(a) Calculate the length of PQ .

..... [2]

(b) Find the equation of the perpendicular bisector of PQ .

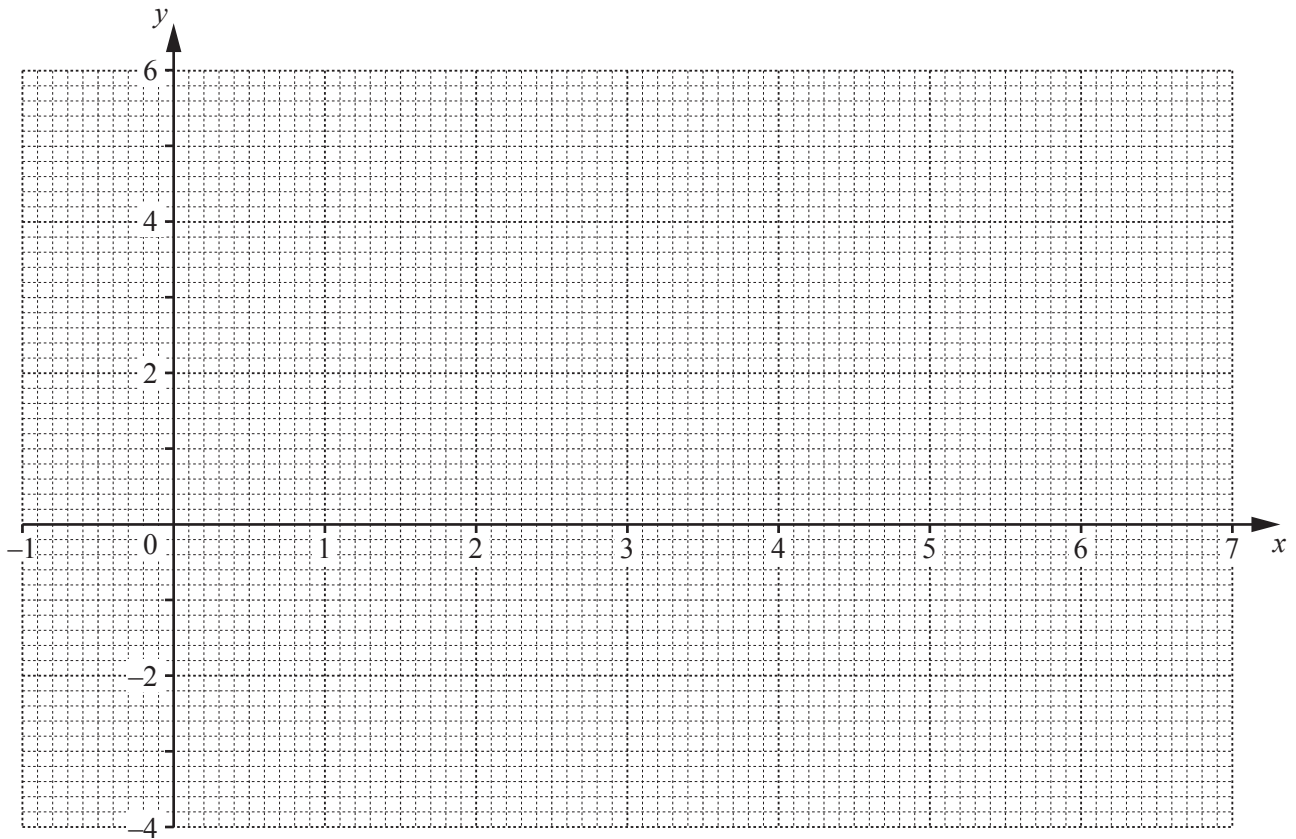
..... [5]

- 9 (a) Complete the table for $y = \frac{x^2}{2} - 3x + 2$.

x	-1	0	1	2	3	4	5	6	7
y		2	-0.5	-2	-2.5	-2	-0.5	2	

[1]

- (b) Draw the graph of $y = \frac{x^2}{2} - 3x + 2$ for $-1 \leq x \leq 7$.



[3]

- (c) By drawing a tangent, estimate the gradient of the curve at $x = 1.5$.

Answer [2]

- (d) Complete these inequalities to describe the range of values of x where $y \geq 0$.

Answer $x \leq$

$x \geq$ [2]

- (e) (i) On the same grid, draw the line $4y + 3x = 12$. [2]

- (ii) The x -coordinates of the points of intersection of this line and the curve are the solutions of the equation $2x^2 + Ax + B = 0$.

Find the value of A and the value of B .

Answer $A =$

$B =$ [2]

- (iv) Solve the equation $22x^2 - 273x + 216 = 0$.
Show your working and give each answer correct to 2 decimal places.

Answer $x = \dots\dots\dots$ or $x = \dots\dots\dots$ [3]

- (b) On Friday, Ravi ran the whole 20km at the same average speed that he ran the final 8km on Monday.

Calculate the time Ravi took to run 20km on Friday.
Give your answer in hours and minutes, correct to the nearest minute.

Answer $\dots\dots\dots$ hours $\dots\dots\dots$ minutes [3]