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MATHEMATICS

0580/04

Paper 4 Calculator (Extended)

For examination from 2025

SPECIMEN PAPER

2 hours

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 [].

This document has **16** pages.

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

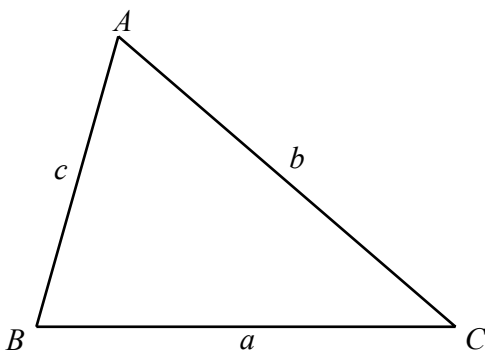
Volume, V , of cylinder of radius r , height h . $V = \pi r^2 h$

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 Write down the integer values of x that satisfy the inequality $-2 \leq x < 2$.

..... [2]

2



In triangle PQR , $QR = 10$ cm and $PR = 11$ cm.

Using a ruler and compasses only, construct triangle PQR .
The line PQ has been drawn for you.

[2]

- 3 Simplify.

$$(x^8y^7) \div (x^{-1}y^3)$$

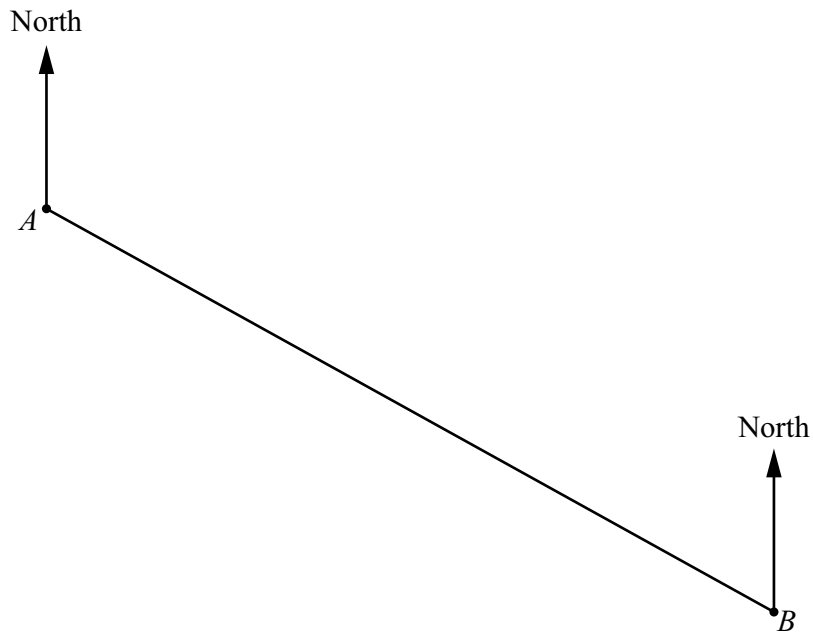
..... [2]

- 4 $f(x) = 3x - 5$
The domain of $f(x)$ is $\{-3, 0, 2\}$.

Find the range of $f(x)$.

{ } [2]

5



Two towns, *A* and *B*, are shown on a map.
The scale of the map is 1 cm to 3 km.

(a) Find the actual distance between *A* and *B*.

..... km [1]

(b) Measure the bearing of *B* from *A*.

..... [1]

(c) Calculate the bearing of *A* from *B*.
You must show all your working.

..... [2]

6 A solid metal cuboid has a volume of 600 cm^3 .

(a) The base of the cuboid is 10 cm by 12 cm.

Calculate the height of the cuboid.

..... cm [2]

(b) The solid metal cuboid is melted and made into 1120 spheres, each with radius 0.45 cm.

Find the volume of metal **not** used in making these spheres.

..... cm^3 [2]

7 On any day the probability that it rains is $\frac{1}{3}$.

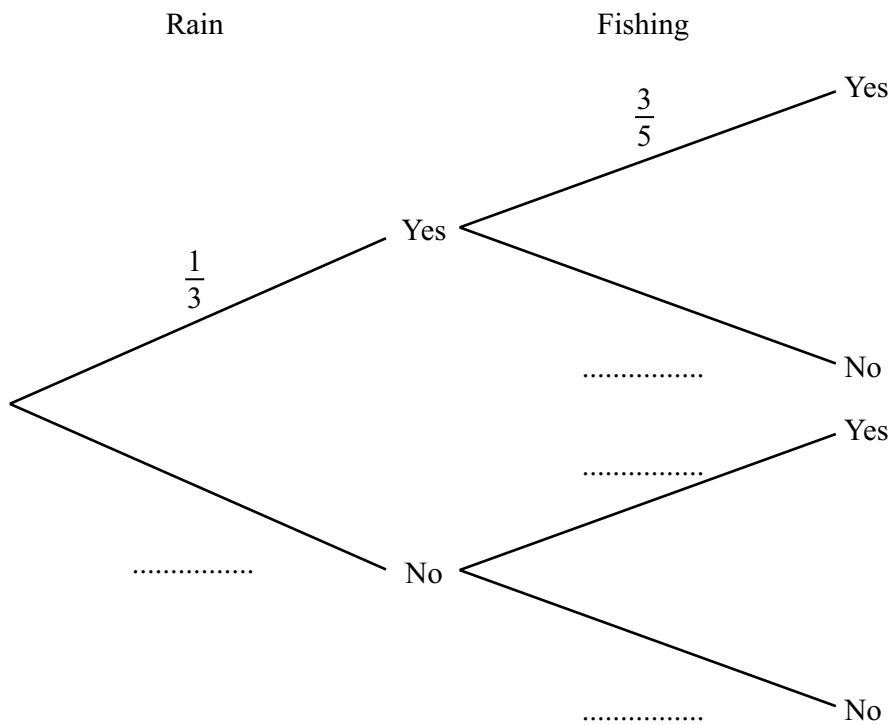
When it rains the probability that Amira goes fishing is $\frac{3}{5}$.

When it does not rain the probability that Amira goes fishing is $\frac{3}{4}$.

(a) In a period of 60 days on how many days is it expected to rain?

..... [1]

(b) Complete the tree diagram.

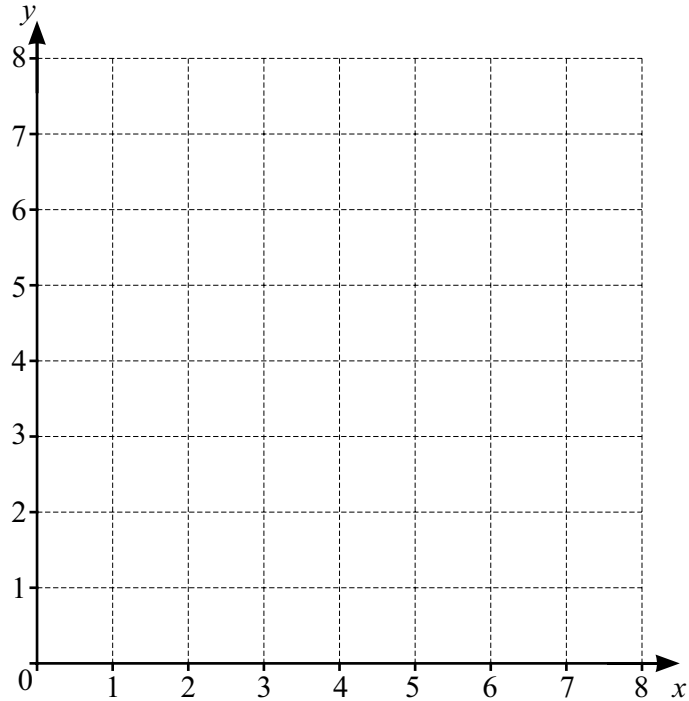


[2]

(c) Find the probability that on any day Amira goes fishing.

..... [3]

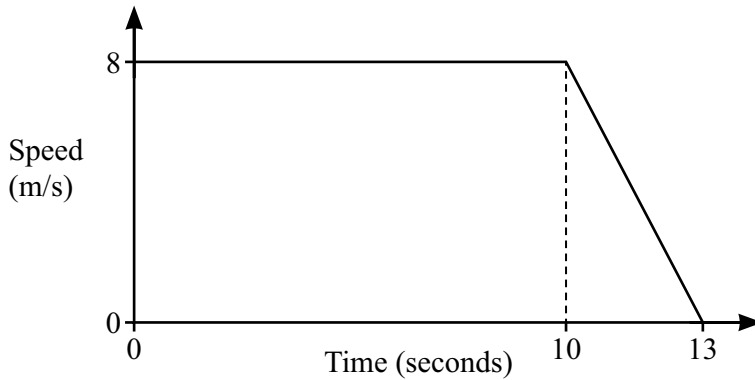
8



(a) On the grid, draw the lines $y = x$ and $x + y = 7$. [3]

(b) Region R satisfies the three inequalities $y \geq 0$, $y \leq x$ and $x + y \geq 7$. On the grid, label the region R. [1]

9



NOT TO SCALE

The diagram shows the speed–time graph of part of a car journey.

(a) Find the deceleration of the car between 10 and 13 seconds.
 m/s² [1]

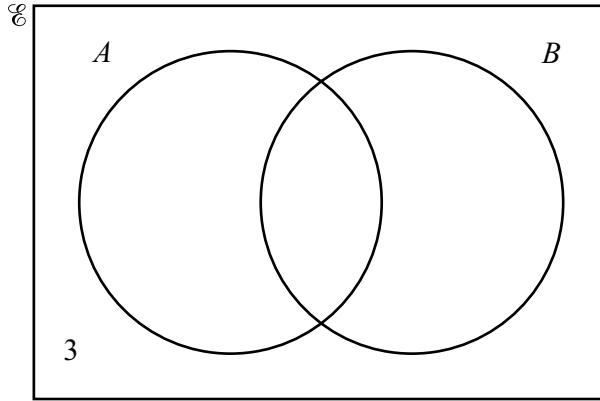
(b) Calculate the total distance travelled during the 13 seconds.
 m [2]

10 Factorise.

$$2x + 6 - 3xy - 9y$$

..... [2]

11



$n(E) = 20$, $n(A \cup B)' = 3$, $n(A) = 10$ and $n(B) = 13$.
The Venn diagram shows some of this information.

Find

(a) $n(A \cap B)$

..... [2]

(b) $n(A' \cap B)$.

..... [1]

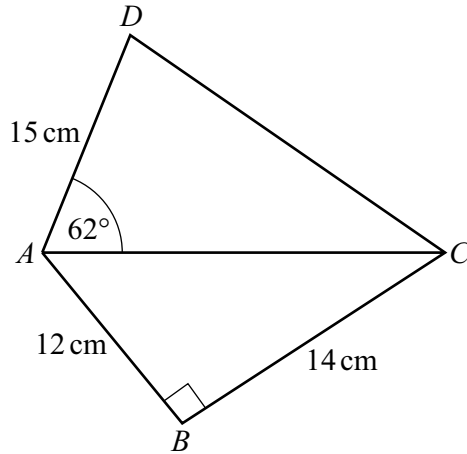
12 The height, h cm, of each of 100 students is measured.
The table shows the results.

Height (h cm)	$100 < h \leq 150$	$150 < h \leq 160$	$160 < h \leq 165$	$165 < h \leq 185$
Frequency	7	30	41	22

Calculate an estimate of the mean.

..... cm [4]

13



NOT TO SCALE

The diagram shows a quadrilateral, $ABCD$, formed from two triangles, ABC and ACD . ABC is a right-angled triangle.

(a) Calculate angle BAC .

Angle $BAC = \dots\dots\dots$ [2]

(b) Calculate BD .

$BD = \dots\dots\dots$ cm [4]

(c) Calculate the shortest distance from D to AC .

$\dots\dots\dots$ cm [3]

- 14 (a) Hong has \$4000 to invest.
 She invests \$2000 at a rate of 2.5% per year **simple** interest.
 She also invests \$2000 at a rate of 2% per year **compound** interest.

(i) Find the value of each investment at the end of 8 years.

Simple interest investment \$

Compound interest investment \$

[5]

(ii) Find the overall percentage increase in the \$4000 investment at the end of 8 years.

.....% [2]

- (iii) Find the number of complete years it takes for the compound interest investment of \$2000 to become greater than \$2500.

..... [3]

- (b) Alain invests \$5000 at a rate of $r\%$ per year compound interest.
At the end of 15 years, the value of the investment is \$7566.

Find the value of r .

$r =$ [3]

15 $y = \sqrt{u^2x}$

(a) Find the value of y when $u = 7$ and $x = 25$.

$y = \dots\dots\dots$ [2]

(b) Rearrange the formula to write x in terms of u and y .

$x = \dots\dots\dots$ [2]

16 A is the point $(7, 2)$ and B is the point $(-5, 8)$.

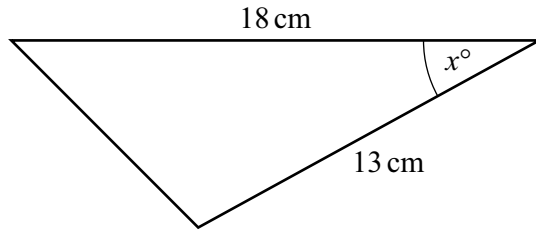
(a) Calculate the length of AB .

$\dots\dots\dots$ [3]

(b) Find the equation of the line that is perpendicular to AB and that passes through the point $(-1, 3)$.
Give your answer in the form $y = mx + c$.

$y = \dots\dots\dots$ [4]

17

NOT TO
SCALE

The area of the triangle is 50 cm^2 .

Calculate the value of $\sin x$.

$$\sin x = \dots\dots\dots [2]$$

18 Solve.

$$\frac{3y}{2y-1} = \frac{3}{4}$$

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

- 19 The cross-section of a prism is an equilateral triangle of side 6 cm.
The length of the prism is 20 cm.

Calculate the total surface area of the prism.

..... cm² [4]

- 20 $y = 2x^k + ux^7$ and $\frac{dy}{dx} = 18x^{k-1} + 21x^6$

Find the value of k and the value of u .

$k =$

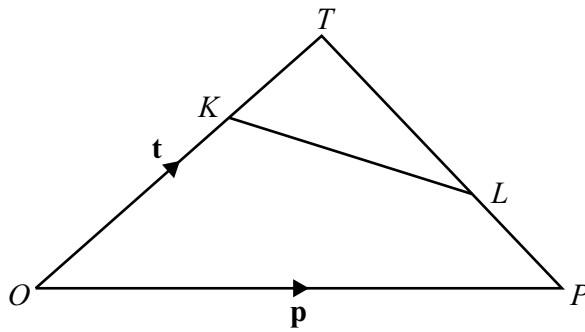
$u =$ [2]

- 21 Simplify.

$$\frac{5p^2 - 20p}{2p^2 - 32}$$

..... [3]

22 The diagram shows triangle OPT .



NOT TO SCALE

In the diagram $\vec{OT} = \mathbf{t}$ and $\vec{OP} = \mathbf{p}$.
 $OK:KT = 2:1$ and $TL:LP = 2:1$.

(a) Find, in terms of \mathbf{t} and \mathbf{p} , in its simplest form

(i) \vec{PL}

(ii) \vec{KL} .

..... [2]

..... [2]

(b) KL is extended to the point M .

$$\vec{KM} = -\frac{2}{3}\mathbf{t} + \frac{4}{3}\mathbf{p}.$$

Show that M lies on OP extended.

[2]

- 23 Serge walks 7.9 km, correct to the nearest 100 metres.
The walk takes 133 minutes, correct to the nearest minute.

Calculate the maximum possible average speed of Serge's walk.
Give your answer in kilometres/hour.

..... km/h [3]

- 24 The straight line $y = 2x + 1$ intersects the curve $y = x^2 + 3x - 4$ at the points A and B .

Find the coordinates of A and B .
Give your answers correct to 2 decimal places.

A (..... ,)

B (..... ,)

[6]

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