![Cambridge Assessment International Education logo]

Cambridge O Level

CANDIDATE NAME	

CENTRE NUMBER		CANDIDATE NUMBER	

MATHEMATICS (SYLLABUS D) **4024/22**

Paper 2 **October/November 2024**

2 hours 30 minutes

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 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 **20** pages. Any blank pages are indicated.

[Turn over

1 (a) These are the contents of a bag of mixed fruit.

Pineapple	96 g
Mango	84 g
Papaya	60 g

Calculate the mass of mango as a percentage of the total mass of the mixed fruit.

.... % [2]

(b) Tom makes a drink by mixing juice and water in the ratio 3 : 7.
He makes 1.4 litres of this drink.

Calculate the amount of juice Tom uses.
Give your answer in millilitres.

.... ml [2]

(c) The cost of a fruit drink is directly proportional to the amount of juice it contains.
A fruit drink containing 125 ml of juice costs $1.50 .

Calculate the cost of a fruit drink containing 175 ml of juice.

$ .... [2]

(d) Kofi has a bag containing nuts and raisins.
There are 285 g of raisins in the bag.
The remaining 62% of the mass in the bag is nuts.

Calculate the mass of nuts in the bag.

.... g **[2]**

(e) The mass of mixed nuts and seeds in a bag is 500 g, correct to the nearest 10 g.
The mass of nuts in the bag is 350 g, correct to the nearest 5 g.

Calculate the upper bound and the lower bound of the mass of seeds in the bag.
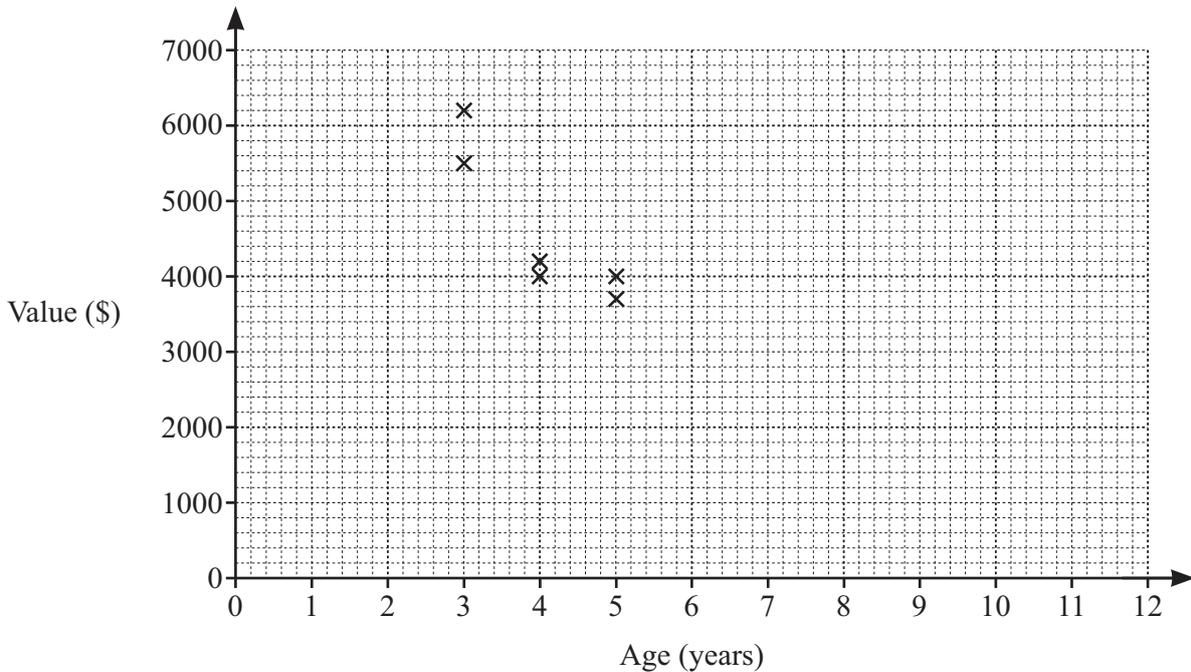
Upper bound = ... g

Lower bound = ... g **[3]**

2 **(a)** The table shows the age and value of 10 cars of the same model.

Age (years)	3	3	4	4	5	5	5	6	8	8
Value ($)	5500	6200	4200	4000	4000	3700	4500	3000	1500	2000

(i) Complete the scatter diagram.
The first 6 points have been plotted for you.

[2]

(ii) Draw a line of best fit. [1]

(iii) Use your line of best fit to find an estimate for the value of a car of this model that is 7 years old.

$ .... [1]

(iv) Jay has a car of this model that is 12 years old and he wants to find its value.

Explain why Jay should not use this scatter diagram to find an estimate for the value of this car.

....

.... [1]

(b) Jay records the distances travelled by 50 cars.
The frequency table shows the results.

Distance (d thousand km)	$10 < d \leqslant 40$	$40 < d \leqslant 50$	$50 < d \leqslant 60$	$60 < d \leqslant 100$
Frequency	8	14	11	17

(i) Work out the fraction of the cars that have travelled more than 50 000 km.
Give your answer in its simplest form.

.... [1]

(ii) Find the interval that contains the median.

.... [1]

(iii) Calculate an estimate of the mean distance travelled.

.... thousand km [3]

3 **(a)**
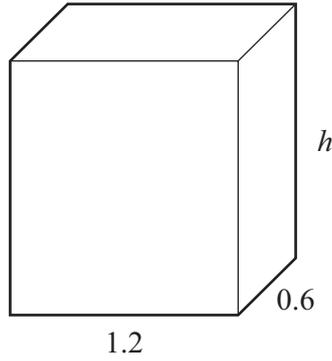
NOT TO
SCALE

The diagram shows a tank.
The tank is a cuboid with length $1.2\,$m, width $0.6\,$m and height $h\,$m.
The volume of the tank is $1.8\,\text{m}^3$.

(i) Calculate the value of h.

$h =$ .... [2]

(ii) Fuel is pumped into the empty tank at a rate of $0.2\,\text{m}^3$ per minute.

Calculate the time taken to fill the tank to 90% of its volume.
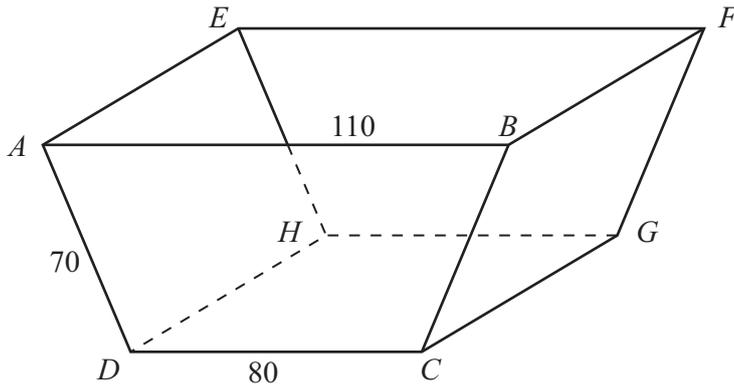Give your answer in minutes and seconds.

.... minutes .... seconds [3]

(b)

NOT TO SCALE

The diagram shows a tank with an open top.
The tank is a prism with trapezium *ABCD* as its cross-section.
AD = *BC* = 70 cm, *CD* = 80 cm and *AB* = 110 cm.
The base of the tank is a square.

Calculate the total surface area of the outside of the tank.

.... cm² [5]

4 **(a)** Anya buys 4 shirts and 3 hats.
She pays $100 and receives $21.50 in change.
Each shirt costs the same amount.
Each hat costs $13.50 .

Work out the cost of one shirt.

$ .... [3]

(b) The exchange rate between dollars ($) and euros (€) is $1 = €0.91 .

Anya buys a new camera for $150.
She sees the same camera for sale online for €140.

Calculate the difference between the price in dollars and the price in euros.
Give your answer in dollars, correct to the nearest cent.

$ .... [2]

(c) Anya invests $600 in a savings account.
The account pays compound interest at a rate of r% per year.
At the end of 3 years the total interest is $21.86 .

Calculate the value of r.

$r = $ .... [3]

5

9

| 1 | 1 | 2 | 2 | 2 | 5 | 6 | 7 | 8 |
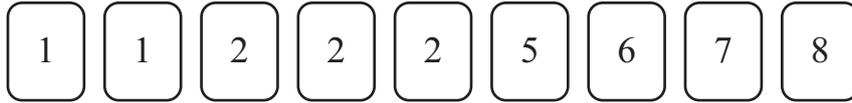
Mandeep has these 9 number cards.

(a) She takes one of the 9 cards at random, notes the number and replaces it.

Find the probability that the card shows an odd number.

.... [1]

(b) Mandeep takes one of the 9 cards at random, notes the number and replaces it.
She then takes a second card at random.

Find the probability that both cards show the number 1.

.... [2]

(c) Mandeep takes two of the 9 cards at random without replacement.
She calculates the product of the two numbers shown.

Find the probability that the product is less than 5.

.... [3]

[Turn over

6 **(a)** Complete the table for $y = \frac{x}{4}(2x^2 - x - 10)$.

x	-3	-2	-1	0	1	2	3
y		0	1.75	0	-2.25	-2	3.75

[1]

(b) Draw the graph of $y = \frac{x}{4}(2x^2 - x - 10)$ for $-3 \leqslant x \leqslant 3$.
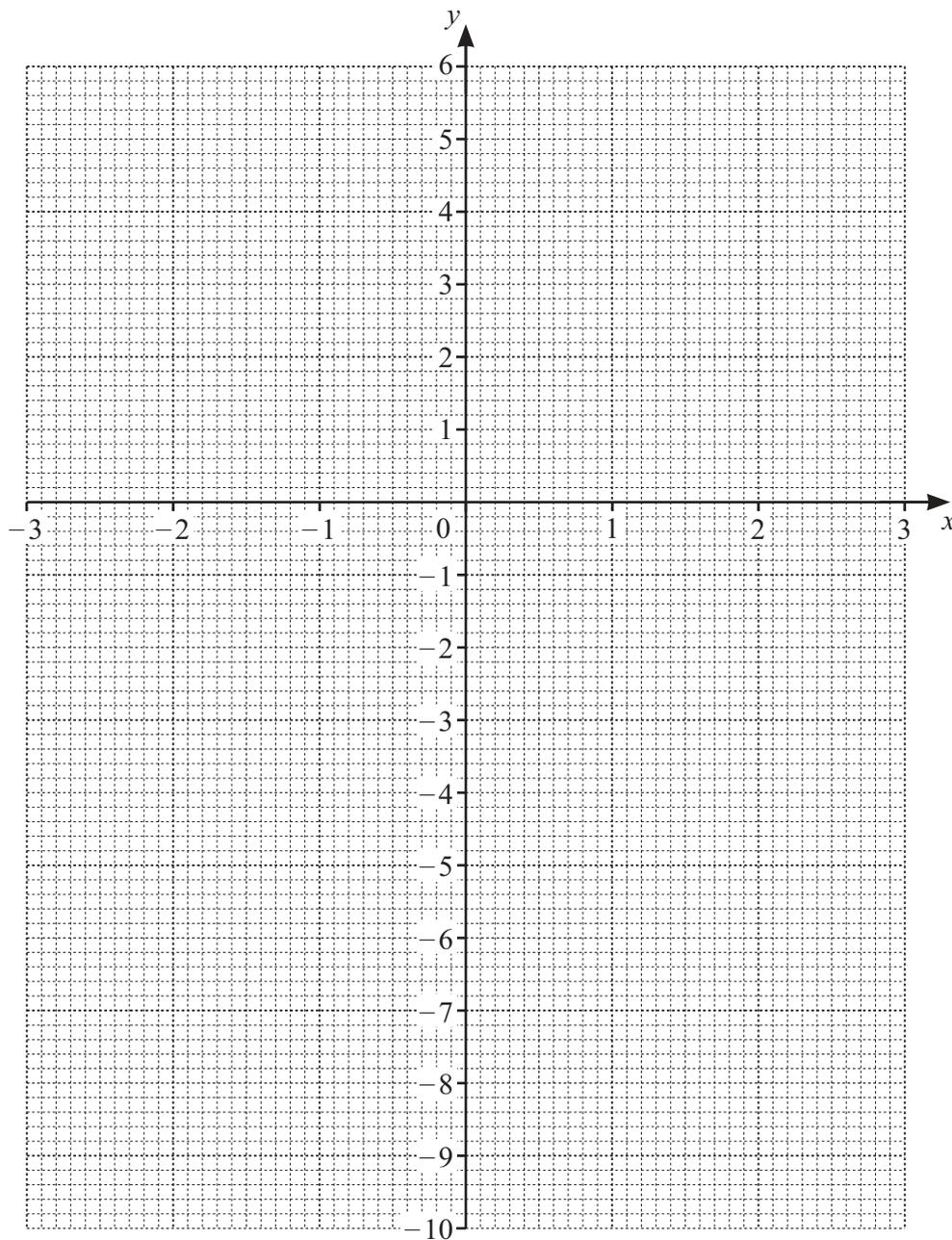
[3]

(c) The equation $\dfrac{x}{4}(2x^2 - x - 10) = k$ has exactly two solutions.

Use your graph to find the possible values of k.

$k = $ .... or $k = $ .... [2]

(d) By drawing a suitable line on the grid, find the solutions of $2x^3 - x^2 - 10x = 2x - 4$.

$x = $ .... , $x = $ .... , $x = $ .... [4]

7 (a) Solve.

$$4x + 7 = 16$$

$x = $ .... [2]

(b) Solve.

$$5(4 - y) = 30$$

$y = $ .... [2]

(c) Write down all the integers that satisfy this inequality.

$$-\frac{3}{2} \leqslant x < 3$$

.... [2]

(d) Rearrange the formula $y = \dfrac{4y - x}{3x}$ to make x the subject.

$x =$ .... [3]

(e) Simplify $\dfrac{12x^2 - 3y^2}{2x^2 + 8x - xy - 4y}$.

.... [4]
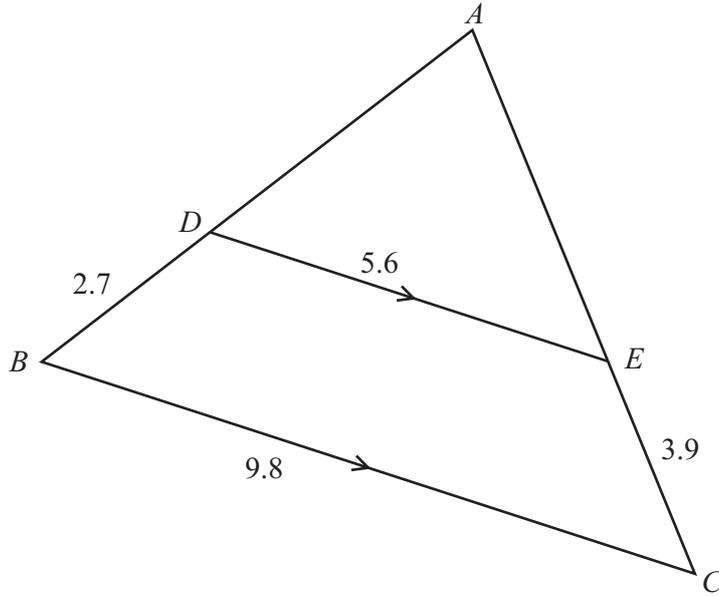
NOT TO
SCALE

ADB and *AEC* are straight lines.
BC is parallel to *DE*.
$BC = 9.8$ cm, $BD = 2.7$ cm, $DE = 5.6$ cm and $CE = 3.9$ cm.

(a) Complete the missing angles and reasons to show that triangle *ABC* is similar to triangle *ADE*.

In triangle *ABC* and triangle *ADE*,

angle *BAC* = angle .... because   common angle

angle *ABC* = angle .... because ....

angle *ACB* = angle .... because ....

As the three pairs of angles are equal, triangle *ABC* is similar to triangle *ADE*.

[3]

(b) Show that $AD = 3.6$ cm and $AE = 5.2$ cm.

[4]

(c) Calculate angle *DAE*.

Angle *DAE* = ... [3]

(d) Calculate the area of triangle *ABC*.

.... cm^2 [2]

9 (a)
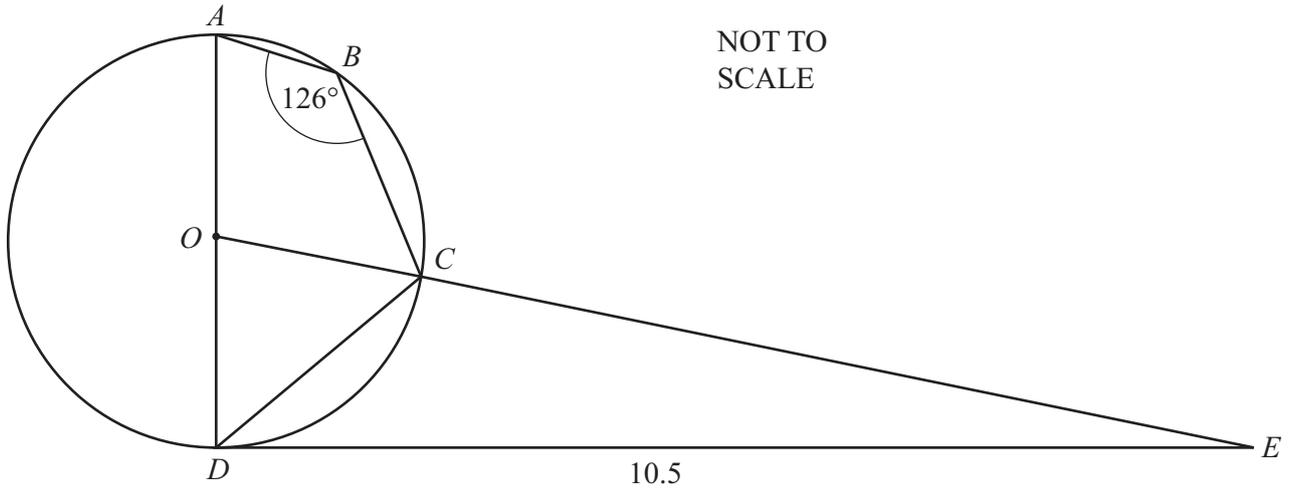
NOT TO SCALE

A, *B*, *C* and *D* are points on a circle, centre *O*.
AOD and *OCE* are straight lines.
DE is a tangent to the circle at *D*.
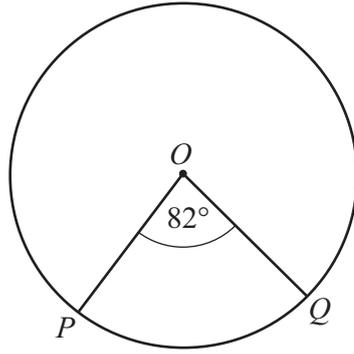Angle *ABC* = 126° and *DE* = 10.5 cm.

Calculate the radius of the circle.

.... cm [5]

(b)

NOT TO
SCALE

P and *Q* are points on a different circle, centre *O*.
The angle of the minor sector *POQ* is 82°.
The length of the minor arc *PQ* is 7.3 cm.

Calculate the area of the major sector.

.... cm^2 [5]

10 The cost of apples is x cents per kilogram.
Mina spends \$9 on apples.

(a) Write down an expression for the mass, in kilograms, of apples Mina receives.

.... kg [1]

(b) The cost of pears is 40 cents per kilogram more than the cost of apples.
Mina spends \$9 on pears.
The mass of pears Mina receives is 0.75 kg less than the mass of apples.

Form an equation in x and show that it simplifies to $x^2 + 40x - 48\,000 = 0$.

[4]

(c) Solve the equation $x^2 + 40x - 48\,000 = 0$.
Show your working.

$x = $ .... or $x = $ .... [3]

4024/22/O/N/24

(d) Narinder buys 1.5 kg of apples and 0.8 kg of pears.

Work out the total amount he pays in dollars.

$ .... [2]

BLANK PAGE