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9543516975

MATHEMATICS **0580/42**

Paper 4 (Extended) **May/June 2022**

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 130.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.

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1 **(a)** Find the lowest common multiple (LCM) of 30 and 75.

..... [2]

(b) Share \$608 in the ratio 4 : 5 : 7.

\$ .....

\$ .....

\$ ..... [3]

(c) Work out $\frac{6.39 \times 10^4}{2.45 \times 10^6}$.

Give your answer in standard form.

..... [2]

(d) Write $0.\dot{2}\dot{7}$ as a fraction.

..... [1]

(e) A stone has volume $45\,cm^3$ and mass 126 g.
Find the density of the stone, giving the units of your answer.

[Density = mass ÷ volume]

.... [2]

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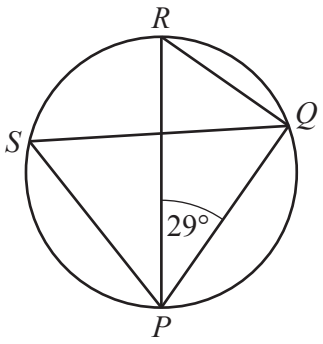
2 **(a)**



NOT TO SCALE

The points P, Q, R and S lie on a circle with diameter PR.

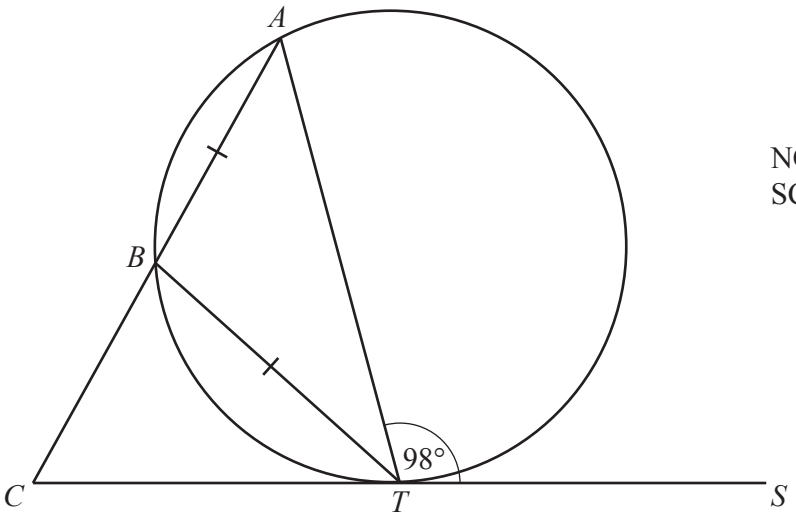
Work out the size of angle PSQ, giving a geometrical reason for each step of your working.

.....

.....

..... [3]

(b)



NOT TO SCALE

The points A, B and T lie on a circle and CTS is a tangent to the circle at T.
ABC is a straight line and $AB = BT$.
Angle $ATS = 98°$.

Work out the size of angle ACT.

Angle $ACT =$ ..... [4]

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3 A line, l, joins point F (3, 2) and point G ($-$ 5, 4).

(a) Calculate the length of line l.

..... [3]

(b) Find the equation of the perpendicular bisector of line l in the form $y = mx + c$.

$y =$ ..... [5]

(c) A point H lies on the y-axis such that the distance $GH = 13$ units.

Find the coordinates of the two possible positions of H.

(....., ...) and (....., ...) [4]

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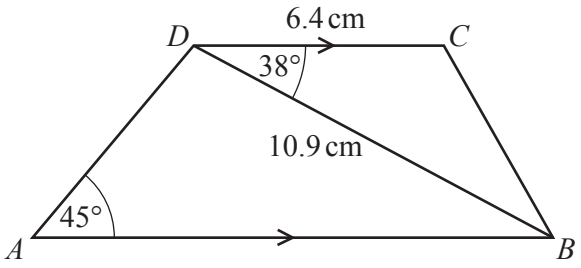
4



NOT TO SCALE

ABCD is a trapezium with *DC* parallel to *AB*.
DC = 6.4 cm, *DB* = 10.9 cm, angle *CDB* = 38° and angle *DAB* = 45°.

(a) Find *CB*.

CB = ... cm [3]

(b) (i) Find angle *ADB*.

Angle *ADB* = ... [1]

(ii) Find *AB*.

AB = ... cm [3]

(c) Calculate the area of the trapezium.

..... cm^2 [3]

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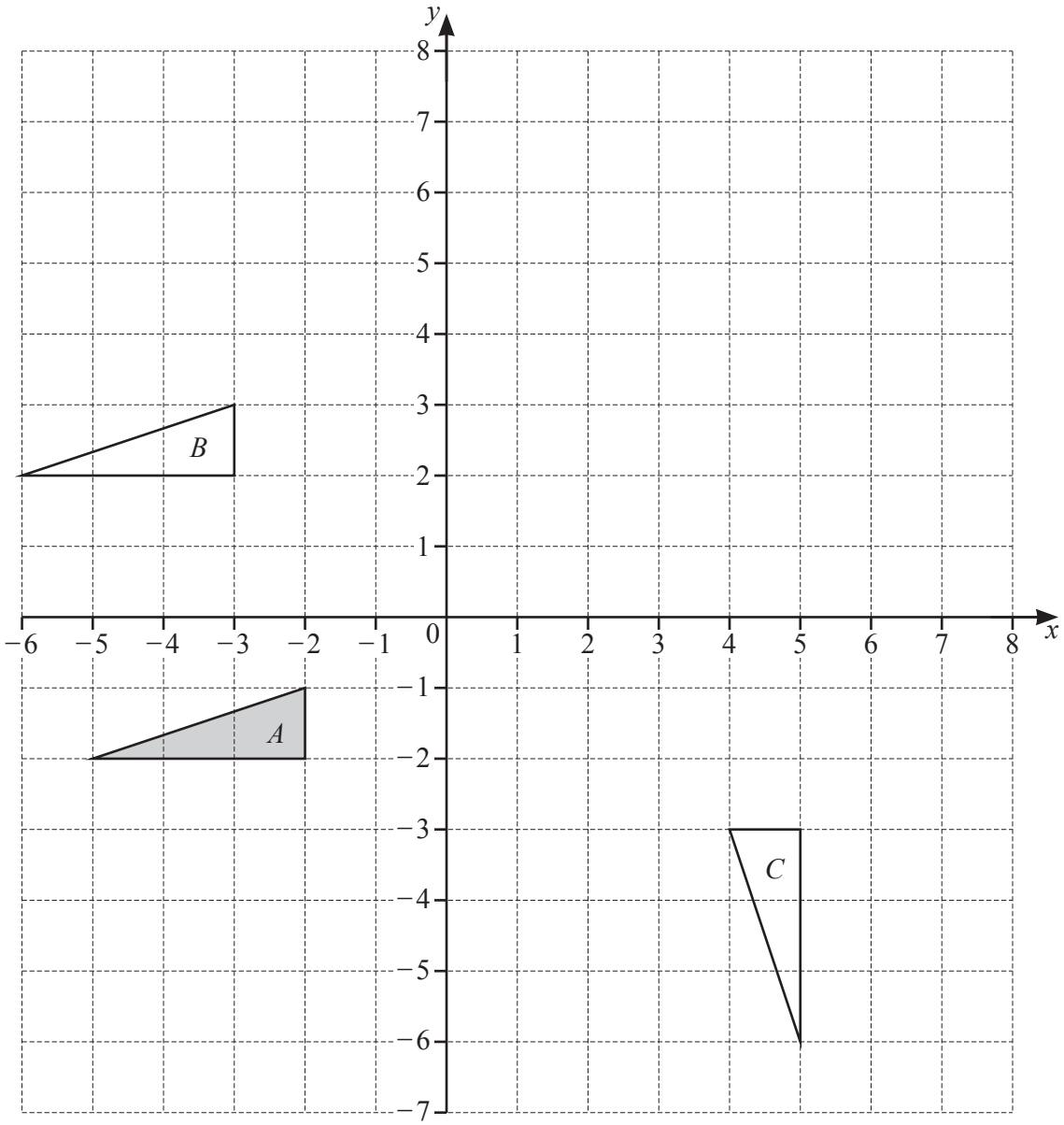
5 **(a)** Draw the lines of symmetry of the rectangle.

[2]

(b)



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(i) Describe fully the **single** transformation that maps

(a) triangle A onto triangle B,

.....

..... [2]

(b) triangle A onto triangle C.

.....

..... [3]

(ii) **(a)** Draw the image of triangle A after reflection in $y = 2$. [2]

(b) Draw the image of triangle A after enlargement by scale factor -2, centre $(-1, 1)$. [2]

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6 **(a)** At a festival, 380 people out of 500 people questioned say that they are camping.
There are 55 300 people at the festival.

Calculate an estimate of the total number of people camping at the festival.

..... [2]

(b) 12 friends travel to the festival.
5 travel by car, 4 travel by bus and 3 travel by train.
Two people are chosen at random from the 12 friends.

Calculate the probability that they travel by different types of transport.

..... [4]

(c) Arno buys a student ticket for $43.68 .
This is a saving of 16% on the full price of a ticket.

Calculate the full price of a ticket.

$ ..... [2]

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(d) At a football match, there are 29 800 people, correct to the nearest 100.

(i) At the end of the football match, the people leave at a rate of 400 people per minute, correct to the nearest 50 people.

Calculate the lower bound for the number of minutes it takes for all the people to leave.

..... min [3]

(ii) At a cricket match there are 27 500 people, correct to the nearest 100.
Calculate the upper bound for the difference between the number of people at the football match and at the cricket match.

..... [2]

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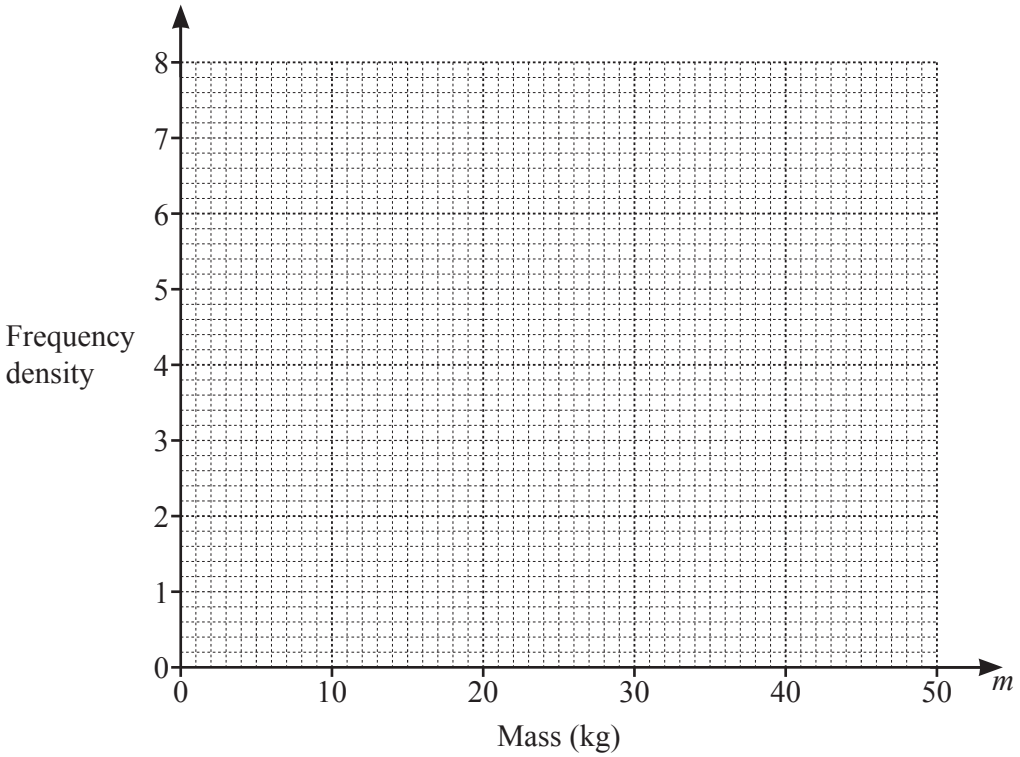
7 Information about the mass, m kg, of each of 150 children is recorded in the frequency table.

Mass (m kg)	$0 < m \leqslant 10$	$10 < m \leqslant 20$	$20 < m \leqslant 25$	$25 < m \leqslant 40$	$40 < m \leqslant 50$
Frequency	12	38	32	50	18

(a) Calculate an estimate of the mean mass.

..... kg [4]

(b) Draw a histogram to show the information in the table.



[4]

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(c) **(i)** Use the frequency table to complete this cumulative frequency table.

Mass (m kg)	$m \leqslant 10$	$m \leqslant 20$	$m \leqslant 25$	$m \leqslant 40$	$m \leqslant 50$
Cumulative frequency					

[2]

(ii) Calculate the percentage of children with a mass greater than 10 kg.

..... % [2]

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8 **(a)** Solve.

$$10 - 3p = 3 + 11p$$

$p =$ ..... [2]

(b) Make m the subject of the formula.

$$mc^2 - 2k = mg$$

$m =$ ..... [3]

(c) Solve.

$$\frac{1}{x-3} + \frac{4}{2x+3} = 1$$

$x =$ ..... or $x =$ ..... [5]

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(d) Solve the simultaneous equations.
You must show all your working.

$$x + 2y = 12$$
$$5x + y^2 = 39$$

$x =$ …….. $y =$ ……

$x =$ …….. $y =$ …… [5]

(e) Expand and simplify.

$$(2x - 3)(x + 6)(x - 4)$$

..... [3]

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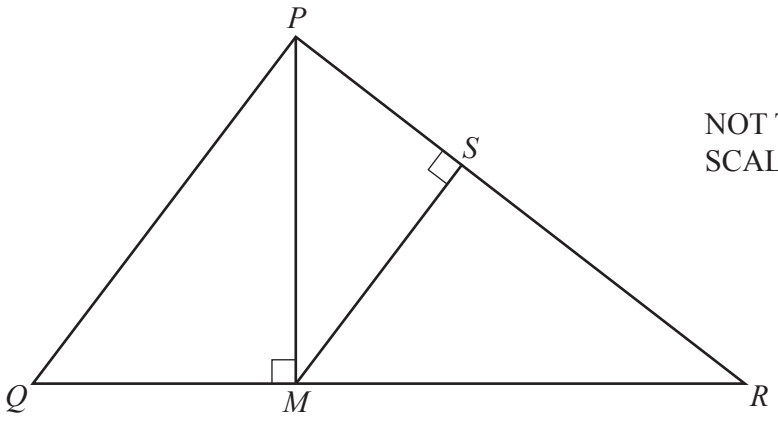
9 **(a)**



NOT TO SCALE

In triangle PQR, M lies on QR and S lies on PR.

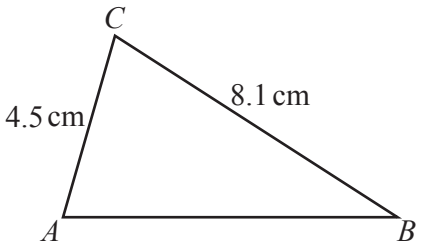
Explain, giving reasons, why triangle PMR is similar to triangle MSR.

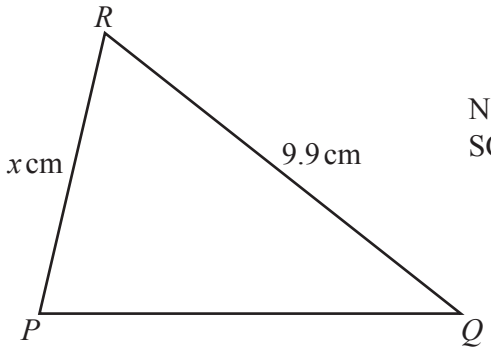
.....

.....

..... [3]

(b)





NOT TO SCALE

Triangle ABC is similar to triangle PQR.

(i) Find the value of x.

$x =$ ..... [2]

(ii) The area of triangle PQR is $25\,\text{cm}^2$.

Calculate the area of triangle ABC.

..... cm^2 [2]

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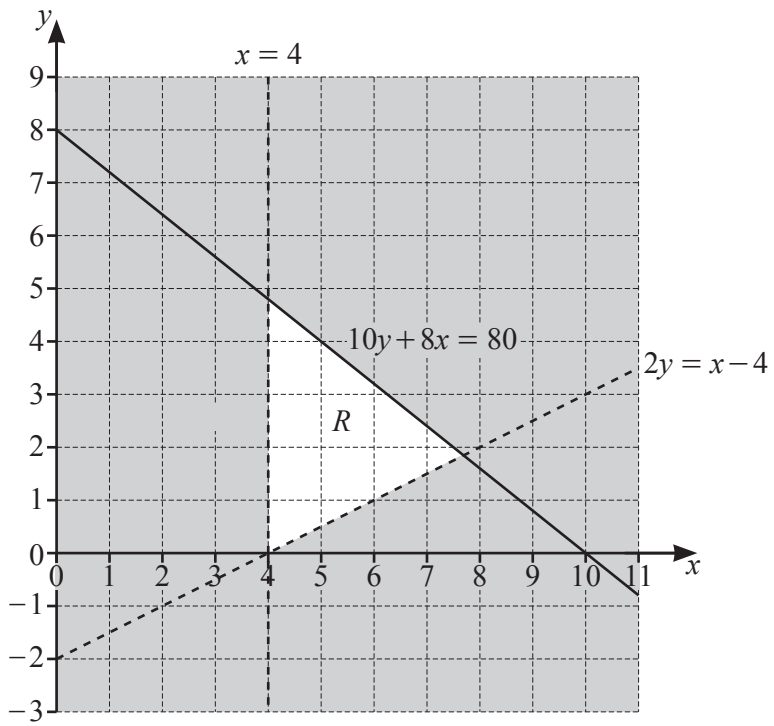
10 **(a)** Find all the positive integers which satisfy the inequality.

$$3n - 8 > 5n - 15$$

..... [2]

(b)



The region marked R is defined by three inequalities.

(i) Find these three inequalities.

.....

.....

..... [3]

(ii) Write down the largest value of $3x + y$ in the region R for integers x and y.

..... [2]

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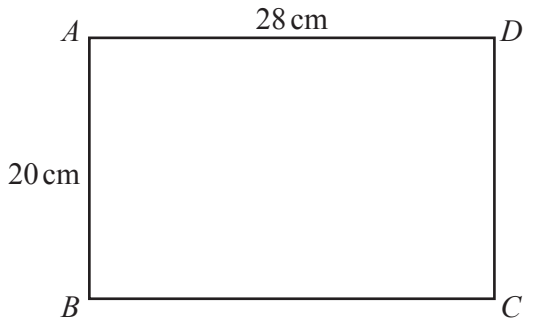
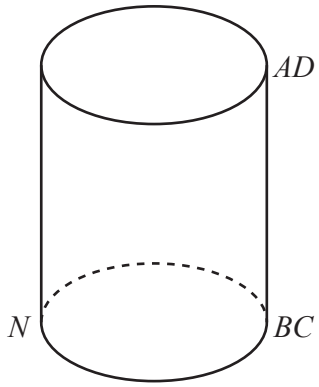
11 (a)





NOT TO SCALE

A rectangular sheet of paper $ABCD$ is made into an open cylinder with the edge AB meeting the edge DC.
$AD = 28$ cm and $AB = 20$ cm.

(i) Show that the radius of the cylinder is 4.46 cm, correct to 3 significant figures.

[2]

(ii) Calculate the volume of the cylinder.

..... cm^3 [2]

(iii) N is a point on the base of the cylinder, such that BN is a diameter.

Calculate the angle between AN and the base of the cylinder.

..... [3]

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(b) The volume of a solid cone is $310\,\text{cm}^3$.
The height of the cone is twice the radius of its base.

Calculate the slant height of the cone.

[The volume, V, of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.]

..... cm [5]

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12 A curve has equation $y = x^3 - kx^2 + 1$.
When $x = 2$, the gradient of the curve is 6.

(a) Show that $k = 1.5$.

[5]

(b) Find the coordinates of the two stationary points of $y = x^3 - 1.5x^2 + 1$.
You must show all your working.

(....., ...) and (....., ...) [4]

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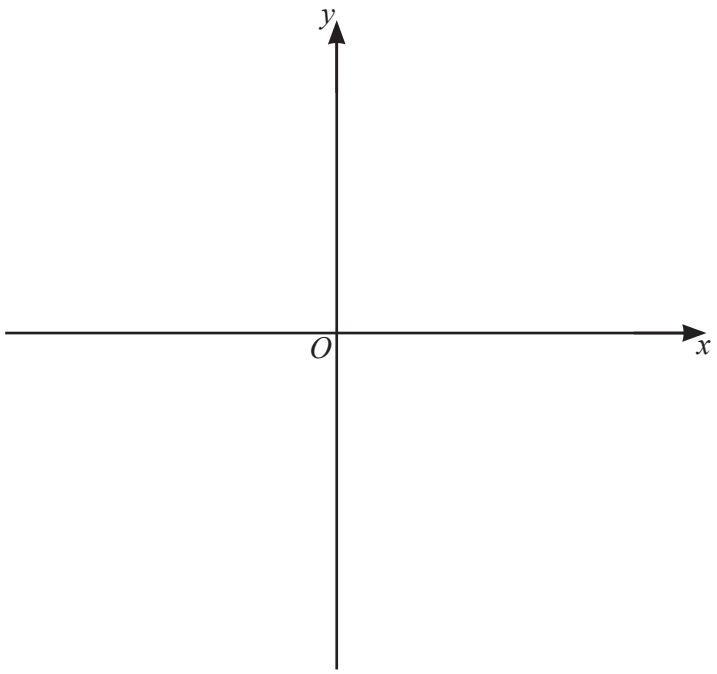
(c) Sketch the curve $y = x^3 - 1.5x^2 + 1$.



[2]

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