Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER | | | | | |

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4263964281

MATHEMATICS (SYLLABUS D) **4024/13**

Paper 1 Non-calculator **May/June 2025**

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.
- Calculators must **not** be used in this paper.
- You may use tracing paper.
- You must show all necessary working clearly.

INFORMATION

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

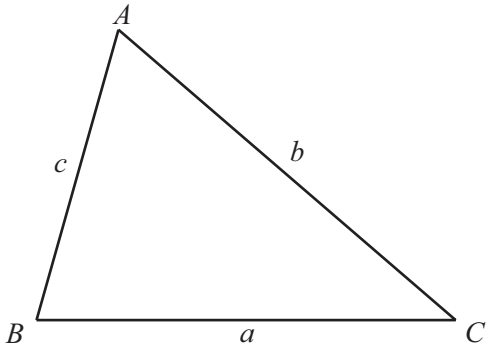
This document has **20** pages.

[Turn over

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,



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

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

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

Calculators must **not** be used in this paper.

1 **(a)** Write 0.07 as a fraction.

..... [1]

(b) Write $\frac{16}{25}$ as a decimal.

..... [1]

2 The favourite ice cream flavours of 20 children are shown.

Vanilla	Vanilla	Strawberry	Chocolate	Chocolate
Strawberry	Chocolate	Chocolate	Vanilla	Strawberry
Chocolate	Vanilla	Vanilla	Strawberry	Chocolate
Strawberry	Chocolate	Vanilla	Chocolate	Vanilla

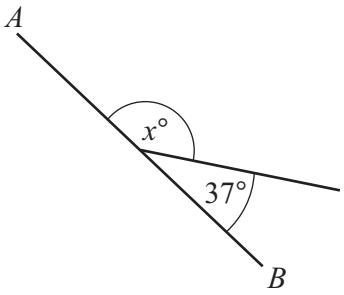
Complete the frequency table.

Flavour	Tally	Frequency
Vanilla		
Strawberry		
Chocolate		

[2]

3 (a)

NOT TO SCALE



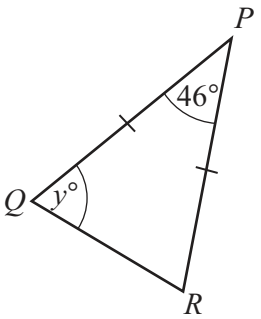
AB is a straight line.

Work out the value of *x*.

x = ... [1]

(b)

NOT TO SCALE



PQR is an isosceles triangle with *PQ* = *PR*.
Angle *QPR* = 46°.

Work out the value of *y*.

y = ... [2]

4 Find the value of $5x+3y$ when $x=4$ and $y=-2$.

..... [2]

5 Write down

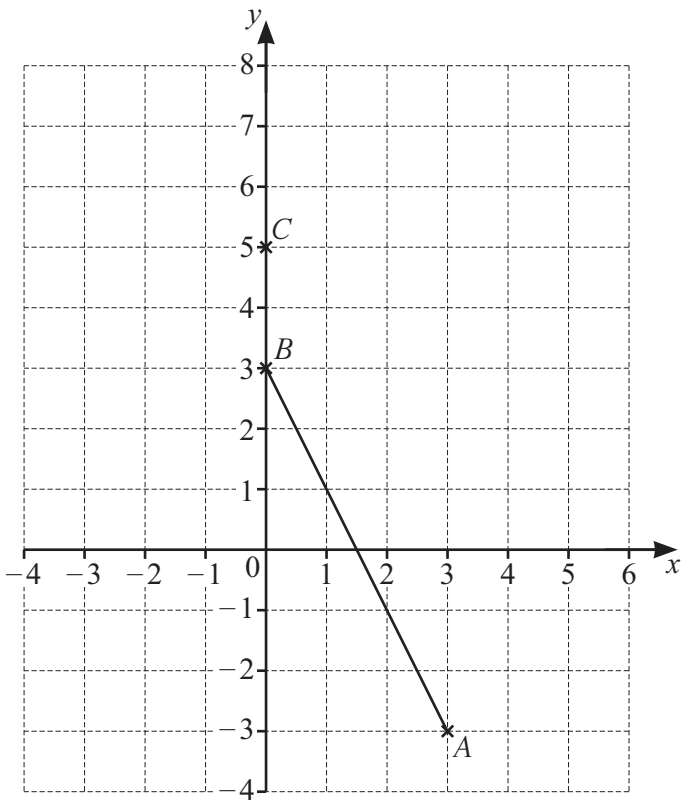
(a) the reciprocal of 7

..... [1]

(b) an irrational number.

..... [1]

6 Point A, point B and point C are plotted on the grid.



(a) On the grid, plot and label the point D (3, 6). [1]

(b) Find the equation of the line

(i) BC

..... [1]

(ii) AB.

..... [2]

7 Asif is making a rectangular lawn 14 m by 19 m.
He uses grass seed to make the lawn.
The grass seed costs \$0.34 for 1 m^2.

By writing each number correct to 1 significant figure, estimate the cost of seed needed.

\$ ..... [3]

8 **(a)** Solve.

$4x - 7 = 9$

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

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

$5y - 8x = -5$
$3y + 2x = 14$

$x =$ .....

$y =$ .....
[3]

9 Work out.

(a) $8 \div 0.1$

..... [1]

(b) $\frac{4}{5} - \frac{1}{2} \times \frac{3}{4}$

..... [3]

10 A spinner can land on red, green, yellow or blue.
The table shows the probability of each outcome.

Colour	Red	Green	Yellow	Blue
Probability	0.35	0.2	0.15	0.4

(a) One of the values in the table is incorrect.

Explain how you know this.

.....

..... [1]

(b) The probability of the spinner landing on blue is incorrect.

Work out the correct probability of the spinner landing on blue.

..... [2]

11 A green light flashes every 12 minutes.
A red light flashes every 45 minutes.
The two lights flash together at 9 am.

Find the next time when the two lights will flash together.

..... [3]

12 $\overrightarrow{PQ} = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$

(a) The position vector of point Q is $\begin{pmatrix} 2 \\ 5 \end{pmatrix}$.

Find the position vector of point P.

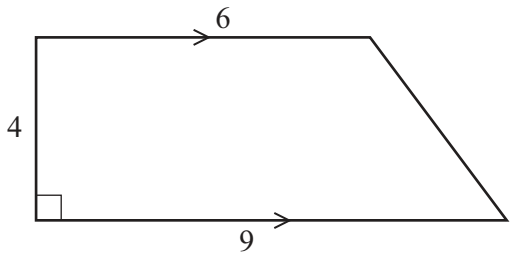
$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [2]

(b) $\left|\overrightarrow{PQ}\right| = \sqrt{a}$

Find the value of a.

$a =$ ..... [2]

13 The diagram shows a trapezium with lengths in centimetres.



NOT TO SCALE

(a) Work out the area of the trapezium.

..... cm^2 [2]

(b) Work out the perimeter of the trapezium.

..... cm [3]

14 **(a)** Find the value of 3^3.

..... [1]

(b) $2^x = 32$

Find the value of x.

$x =$ ..... [1]

(c) Simplify.

$3a^{-3} \times 6a$

..... [2]

15 **(a)** Work out 70% of 120.

..... [2]

(b) Find 8 as a percentage of 25.

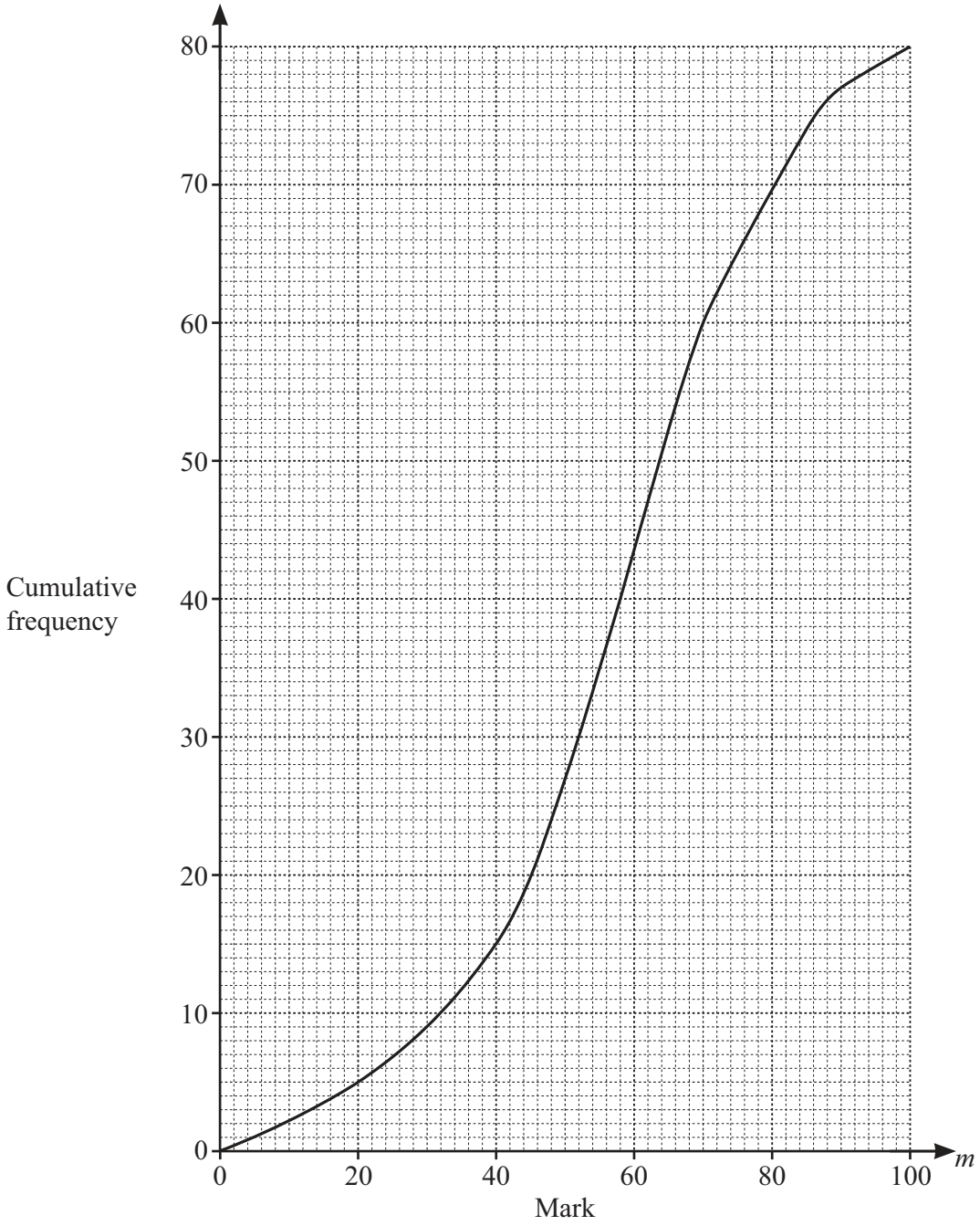
.....% [1]

(c) In a sale, the original price of a jacket is reduced by 12%.
The sale price of the jacket is $66.

Calculate the original price of the jacket.

$ ..... [2]

16 The cumulative frequency diagram gives information about the marks scored by 80 students in an exam.



(a) Use the cumulative frequency diagram to complete the frequency table.
The first two frequencies have been completed for you.

Mark (m)	$0 < m \leqslant 20$	$20 < m \leqslant 40$	$40 < m \leqslant 55$	$55 < m \leqslant 70$	$70 < m \leqslant 90$	$90 < m \leqslant 100$
Frequency	5	10				

[2]

(b) Use the cumulative frequency diagram to find an estimate of

(i) the median mark

..... [1]

(ii) the 30th percentile

..... [2]

(iii) the number of students who scored 76 marks or more.

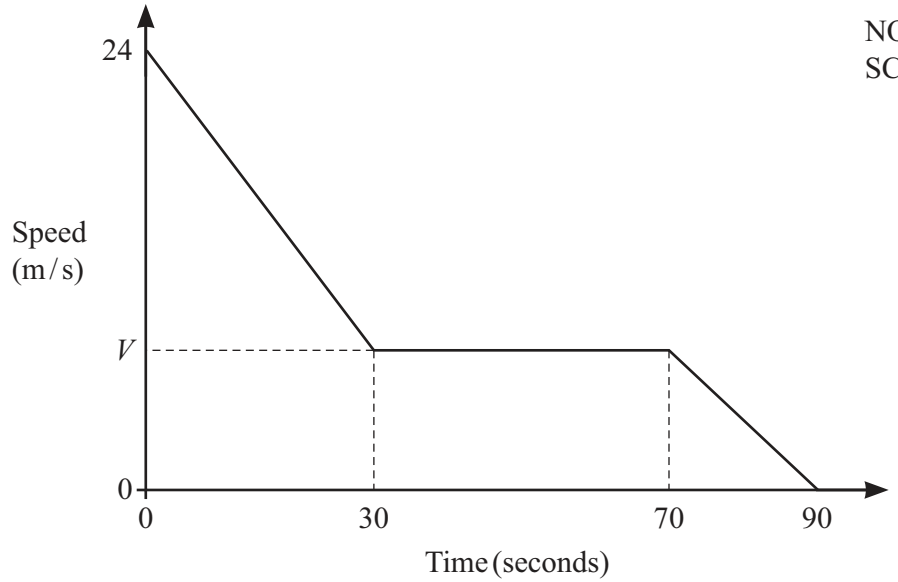
..... [2]

17 Rearrange the formula to make x the subject.

$$ax = \frac{3x+2}{5}$$

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

18 The diagram shows the speed–time graph for part of a car's journey.



(a) The car travels a total distance of 1.01 km in the 90 seconds.

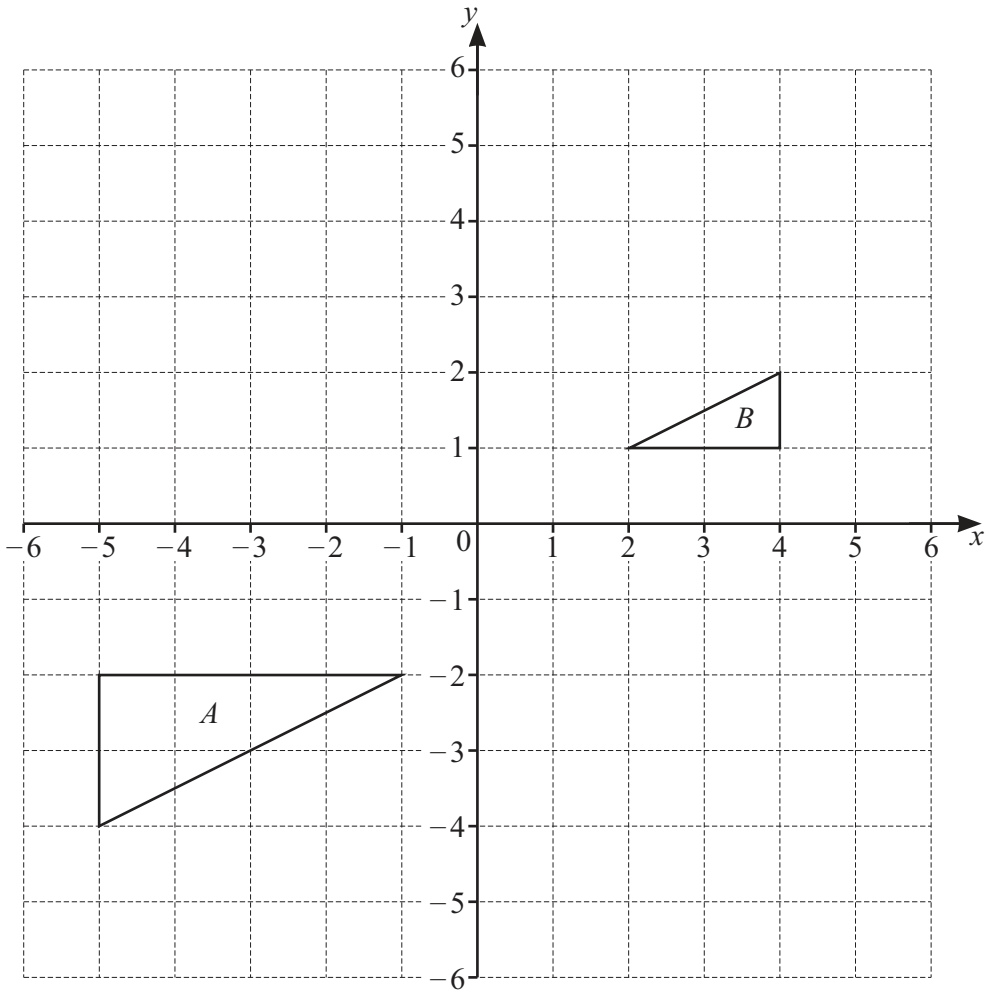
Calculate the value of V.

$V =$ ..... [4]

(b) Calculate the deceleration of the car in the last 20 seconds.

..... m/s^2 [1]

19 The diagram shows triangle A and triangle B.

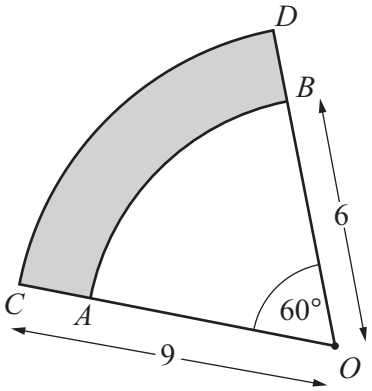


Describe fully the **single** transformation that maps triangle A onto triangle B.

.....

..... [3]

20



NOT TO SCALE

OAB and *OCD* are sectors of circles, each with centre *O* and angle 60°.

Sector *OAB* has radius 6 cm.
Sector *OCD* has radius 9 cm.

(a) The perimeter of the shaded region is $(a\pi + b)$ cm.

Find the value of a and the value of b.

$a =$ .....

$b =$ .....
[3]

(b) Calculate the area of the shaded region.
Give your answer in its simplest form in terms of π.

..... cm^2 [3]

21 Line L has equation $2y = 5x + 3$.

Find the equation of the line perpendicular to L which passes through the point (1, 4).

..... [4]

22 Simplify.

$$\frac{x^2 - 9}{5x^2 - 11x - 12}$$

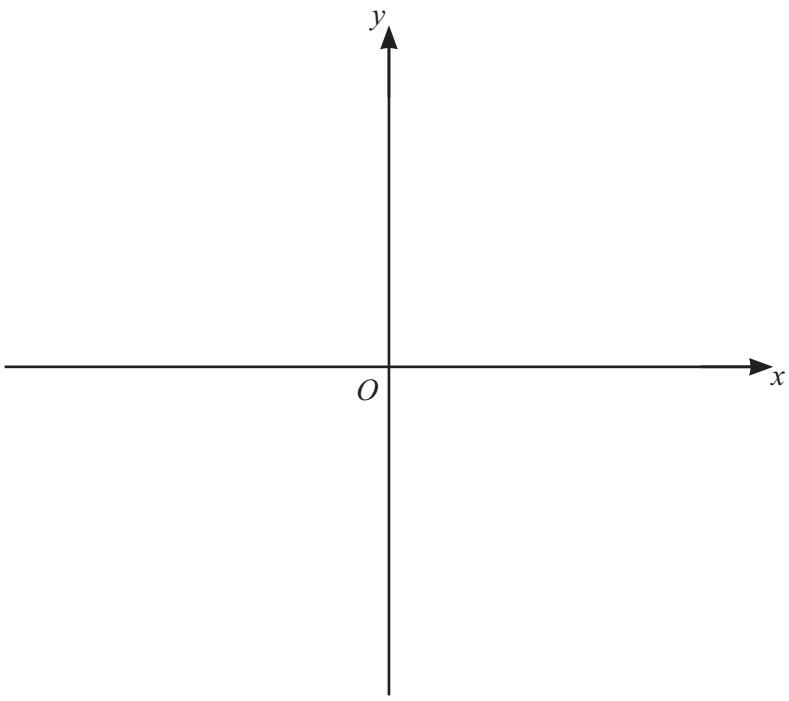
..... [4]

23 **(a)** Expand and simplify.

$$(x-3)(2x+5)(x+2)$$

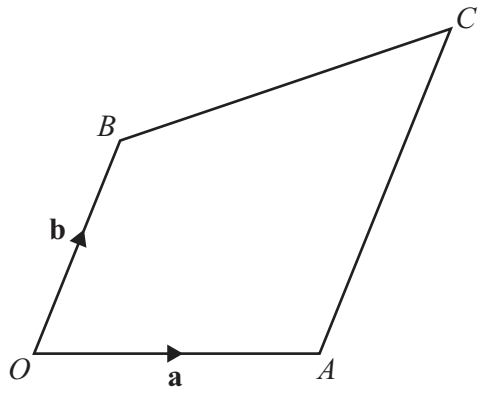
..... [3]

(b) Sketch the graph of $y=(x-3)(2x+5)(x+2)$.
On the sketch, label the values where the graph crosses the axes.



[4]

24 The diagram shows the quadrilateral $OACB$.



NOT TO SCALE

$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.
OB is parallel to AC and $AC = 2OB$.

(a) Find, in its simplest form, in terms of **a** and **b**

(i) $\overrightarrow{AB}$

$\overrightarrow{AB} =$ ..... [1]

(ii) $\overrightarrow{OC}$.

$\overrightarrow{OC} =$ ..... [1]

(b) X is the point on OC such that $OX : XC = 4 : 1$.

Find $\overrightarrow{BX}$.
Give your answer in its simplest form in terms of **a** and **b**.

$\overrightarrow{BX} =$ ..... [3]

Question 25 is printed on the next page.

25 **(a)** Simplify.

$$\sqrt{300} - \sqrt{48}$$

..... [2]

(b) Rationalise the denominator.
Give your answer in its simplest form.

$$\frac{6}{\sqrt{7}+2}$$

..... [3]