1 3.56 5 $\sqrt{196}$ 8 $\sqrt{7}$ 12

From the list, write down a number that is

(a) a multiple of 3,

12 [1]

(b) a cube number,

8 [1]

(c) a prime number,

5 [1]

(d) an irrational number.

$\sqrt{7}$ [1]

2 The number of people swimming in a pool is recorded each day for 12 days.

24	28	13	38	15	26
45	21	48	36	18	38

(a) Complete the stem-and-leaf diagram.

1	3 5 8
2	1 4 6 8
3	6 8 8
4	5 8

Key: 1 | 3 represents 13 swimmers

[2]

(b) Find the median number of swimmers.

$\frac{26 + 28}{2}$

27 [1]

3 Point A has coordinates (6, 4) and point B has coordinates (2, 7).

Write $\overrightarrow{AB}$ as a column vector.

$\begin{pmatrix} 2-6 \\ 7-4 \end{pmatrix}$

$\overrightarrow{AB} = \begin{pmatrix} -4 \\ 3 \end{pmatrix}$ [1]

4 Find the interior angle of a regular polygon with 24 sides.

$\frac{(24-2)\,180^\circ}{24}$

.....165°..... [2]

5 **Without using a calculator,** work out $\frac{15}{28} \div \frac{4}{7}$.

You must show all your working and give your answer as a fraction in its simplest form.

$\frac{15}{28} \times \frac{7}{4} = \frac{15}{4 \times 4} = \frac{15}{16}$

$\frac{15}{16}$ ..... [3]

6 The table shows the marks scored by 40 students in a test.

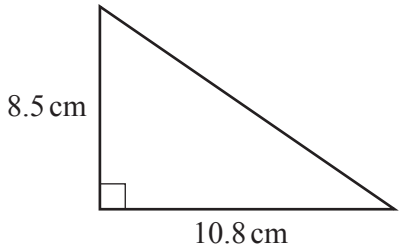
Mark	5	6	7	8	9	10
Frequency	8	5	11	7	5	4

Calculate the mean mark.

$$\frac{5\times 8 + 6\times 5 + 7\times 11 + 8\times 7 + 9\times 5 + 10\times 4}{40}$$

..... 7.2 ..... [3]

7



NOT TO SCALE

The diagram shows a right-angled triangle.

(a) Calculate the area.

$$\frac{1}{2} \times 8.5 \times 10.8$$

..... 45.9 ..... cm^2 [2]

(b) Calculate the perimeter.

$$\text{hypotenuse} = \sqrt{8.5^2 + 10.8^2} = 13.744$$

$$\text{perimeter} = 8.5 + 10.8 + 13.744$$

..... 33.0 ..... cm [3]

8 Calculate the value of $(2.3\times 10^{-3}) + (6.8\times 10^{-4})$.
Give your answer in standard form.

$$23 \times 10^{-4} + 6.8 \times 10^{-4}$$

$$= 29.8 \times 10^{-4}$$

..... 2.98×10^{-3} ..... [1]

9 **(a)** Factorise completely.

$3x^2 - 12xy$

$3x(x-4y)$ [2]

(b) Expand and simplify.

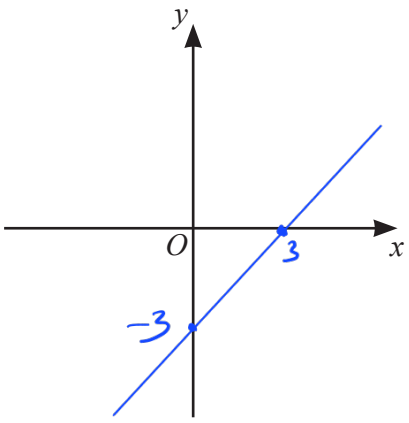
$(m-3)(m+2)$

$m^2 - 3m + 2m - 6$

$m^2 - m - 6$ [2]

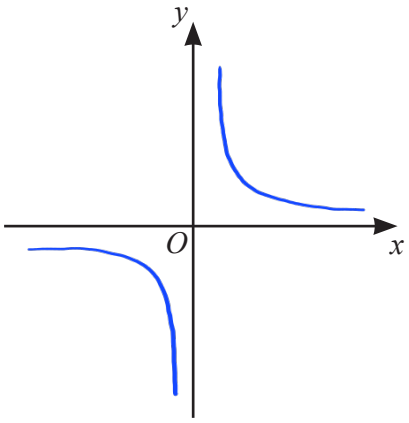
10 Sketch the graph of each function.

(a) $y = x - 3$



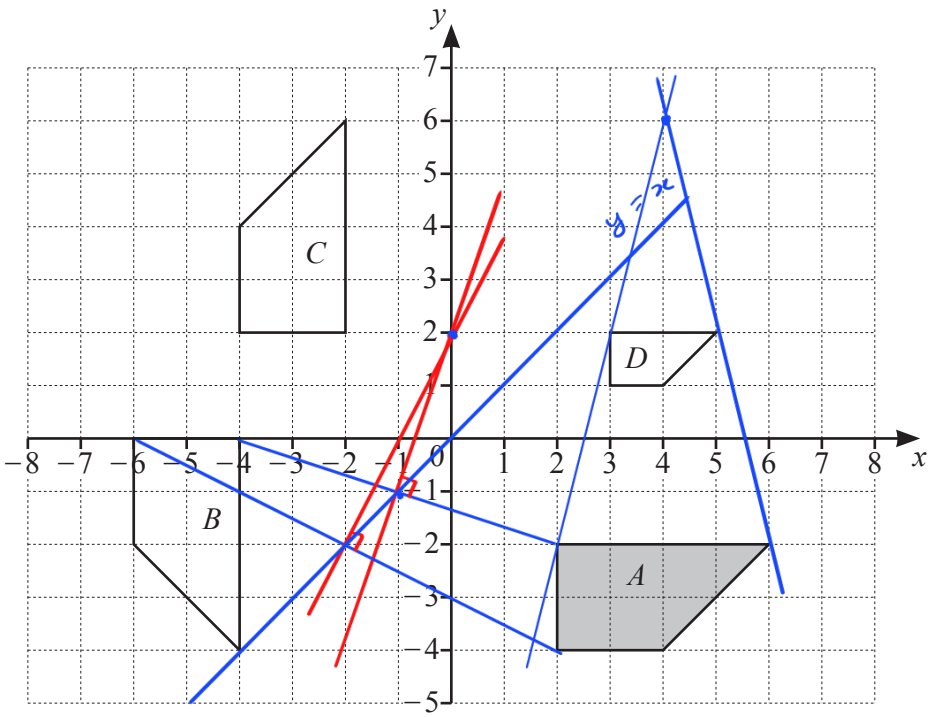
[1]

(b) $y = \frac{1}{x}$



[2]

11



Describe fully the **single** transformation that maps

(a) shape *A* onto shape *B*,

Rotation , center (0, 2), clockwise 90°

[3]

(b) shape *A* onto shape *C*,

Reflection over $y = x$

[2]

(c) shape *A* onto shape *D*.

Enlargement , center (4, 6) , scale factor $\frac{1}{2}$

[3]

12 The population of a town decreases exponentially at a rate of 1.7% per year.
The population now is 250 000.
Calculate the population at the end of 5 years.
Give your answer correct to the nearest hundred.

$250\,000\left(1-\frac{1.7}{100}\right)^5 = 229\,460$

229 500 [3]

13 Write the recurring decimal $0.2\dot{6}$ as a fraction.
You must show all your working.

$x = 0.2666\ldots$

$10x = 2.666\ldots$

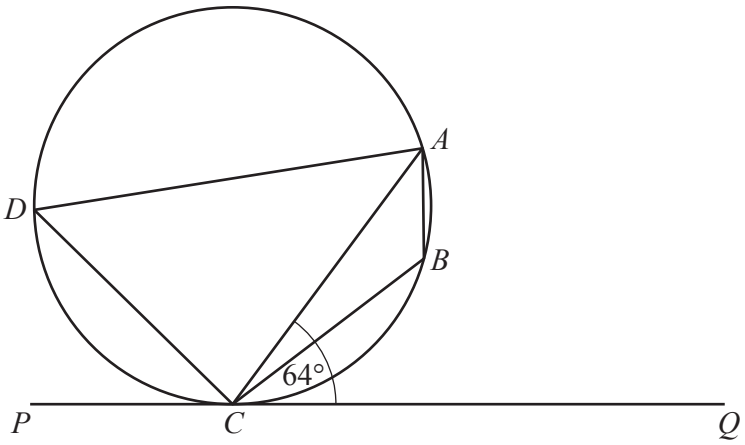
$100x = 26.666\ldots$

$90x = 26 - 2 = 24$

$x = \frac{24}{90}$

$\frac{24}{90}$ [2]

15



NOT TO SCALE

A, B, C and D lie on the circle.
PCQ is a tangent to the circle at C.
Angle $ACQ = 64°$.

Work out angle ABC, giving reasons for your answer.

Angle ABC = 116° because $\widehat{ADC} = \widehat{ACQ}$ (alternate segment theorem) and $\widehat{ABC} = 180° - \widehat{ADC} = 180° - 64° = 116°$ (2 opposite angles in a cyclic quadrilateral add up to 180°) [3]

16 Solve the simultaneous equations.
You must show all your working.

$$x = 7 - 3y$$
$$x^2 - y^2 = 39$$

$(7-3y)^2 - y^2 = 39$

$49 - 2 \times 7 \times 3y + 9y^2 - y^2 = 39$

$8y^2 - 42y + 10 = 0$

$2(4y-1)(y-5) = 0$

$y = 0.25$ or $y = 5$

When $y = 0.25$, $x = 7 - 3 \times 0.25 = 6.25$

When $y = 5$, $x = 7 - 3 \times 5 = -8$

$x =$ 6.25 $y =$ 0.25

$x =$ −8 $y =$ 5 [6]

17 A is the point (3, 5) and B is the point $(1, -7)$.
Find the equation of the line perpendicular to AB that passes through the point A.
Give your answer in the form $y = mx + c$. ℓ

$m_{AB} = \frac{-7-5}{1-3} = 6$

$m_\ell = -1 : 6 = -\frac{1}{6}$

Equation of line ℓ: $y - 5 = -\frac{1}{6}(x-3)$

$y =$ $-\frac{1}{6}x + \frac{11}{2}$ [4]

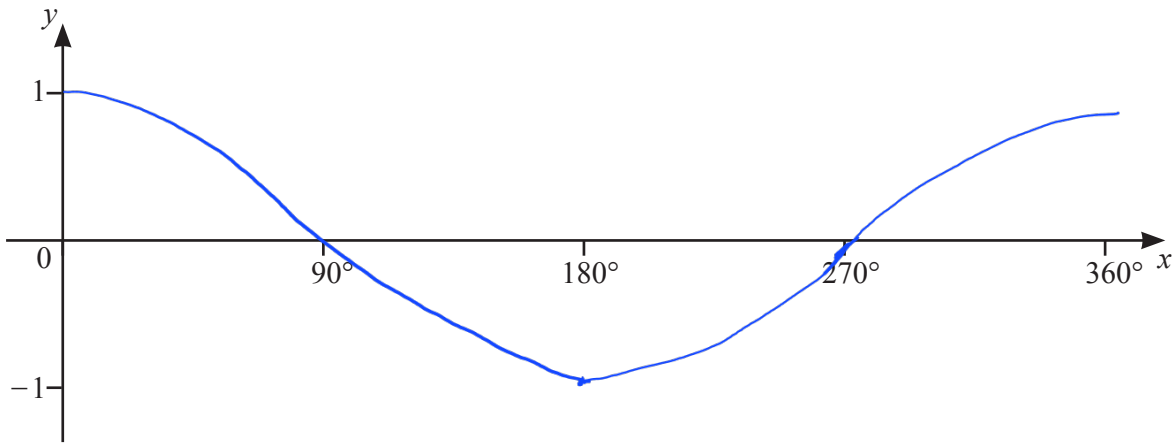
18 A car travels at a constant speed.
It travels a distance of 146.2 m, correct to 1 decimal place.
This takes 7 seconds, correct to the nearest second.

Calculate the upper bound for the speed of the car.

$\text{speed (max)} = \frac{\text{distance (max)}}{\text{time (min)}} = \frac{146.2 + \frac{0.1}{2}}{7 - \frac{1}{2}} = 22.5$

22.5 m/s [3]

19



(a) On the diagram, sketch the graph of $y = \cos x$ for $0° \leqslant x \leqslant 360°$. [2]

(b) Solve the equation $4\cos x + 2 = 3$ for $0° \leqslant x \leqslant 360°$.

$4\cos x = 1$

$\cos x = 0.25$

$x = 75.5°$ or $x = -75.5°$

or $x = -75.5° + 360° = 284.5°$

$x =$ 75.5° and $x =$ 284.5° [3]

20 $x^2 - 12x + a = (x+b)^2$

Find the value of a and the value of b.

$x^2 - 12x + a = x^2 + 2xb + b^2$

$\begin{cases} -12 = 2b \\ a = b^2 \end{cases}$

$\begin{cases} b = -6 \\ a = 36 \end{cases}$

$a =$ 36

$b =$ −6 [2]

21 $\overrightarrow{XY} = 3\mathbf{a} + 2\mathbf{b}$ and $\overrightarrow{ZY} = 6\mathbf{a} + 4\mathbf{b}$. $\overrightarrow{ZY} = 2\overrightarrow{XY}$

Write down two statements about the relationship between the points X, Y and Z.

1 X, Y, Z are collinear

2 X is the midpoint of YZ [2]