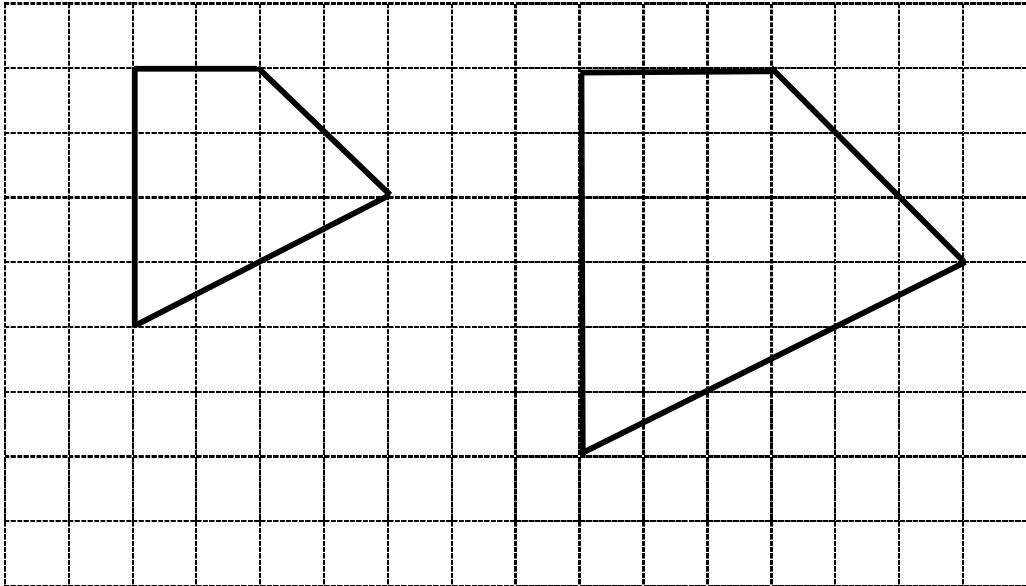


Marking scheme

Qn	Solutions	Marks allocation
1	$\frac{3}{5}$ $\frac{\sqrt{14}}{6}$ $\frac{\pi}{5}$ 63% $\frac{17}{25}$	B2 – all correct B1 – 1mistake B0 - >1 mistake
2	$\frac{250-189}{250} \times 100\%$ $= 24.4\%$	M1 A1
3a	250 : 3000 1 : 12	B1
3b	$x + y \text{ units} \rightarrow k$ $1 \text{ unit} \rightarrow \frac{k}{x + y}$ $x \text{ units} \rightarrow \frac{kx}{x + y}$	B1
4a	$\sin x = 0.813$ $x = \sin^{-1}(0.813)$ $x = 54.39^\circ \text{ or } x = 180^\circ - 54.39^\circ$ $= 125.6^\circ \text{ (1 dp)}$ Answer : 125.6°	B1
4b	124.8°	B1
5	$y = \frac{k}{\sqrt{x}}$ $1.5 = \frac{k}{\sqrt{16}}$ $k = 1.5 \times \sqrt{16}$ $k = 6$ $y = \frac{6}{\sqrt{x}}$	M1 A1
6	$\sqrt{(3 - (-2))^2 + (-1 - 5)^2}$ $= 7.81 \text{ units (3sf)}$	M1 A1

7	 B2 – correct figure B1 – one pair of sides drawn correctly	
8a	$-6y \geq 15$ $6y \leq -15$ $y \leq -2.5$ Largest integer value = -3	M1 A1
8b	$(3x+5)(7x-2)$ $= 21x^2 - 6x + 35x - 10$ $= 21x^2 + 29x - 10$	M1 A1
9a	$180^\circ - 18^\circ - 18^\circ$ (angle sum of triangle) $= 144^\circ$	B2
9b	$\frac{(n-2) \times 180}{n} = 144$ $180n - 360 = 144n$ $180n - 144n = 360$ $36n = 360$ $n = 10$	M1 A1

	Or One exterior angle $180^\circ - 144^\circ = 36^\circ$ Number of sides $= \frac{360^\circ}{36^\circ}$ $= 10$	M1 A1
10a	$\sqrt{a^{16}} \times a^3 = a^n$ $(a^{16})^{\frac{1}{2}} \times a^3 = a^n$ $a^8 \times a^3 = a^n$ $a^{11} = a^n$ $n = 11$	M1 A1
10b	$3^x + 3^x + 3^x = 1$ $3(3^x) = 3^0$ $3^{x+1} = 3^0$ $x+1 = 0$ $x = -1$	M1 A1
11b	$\frac{15}{8}$	B1
12a	$6x^2y - 15xy^2$ $= 3xy(2x - 5y)$	B1
12b	$\frac{1}{x^2 - 9} + \frac{4}{x + 3}$ $= \frac{1}{(x + 3)(x - 3)} + \frac{4}{x + 3}$ $= \frac{1 + 4(x - 3)}{(x + 3)(x - 3)}$ $= \frac{1 + 4x - 12}{(x + 3)(x - 3)}$ $= \frac{4x - 11}{(x + 3)(x - 3)}$	M1(for correct numerator) A1
13a	-2	B1
13b	$-4n + 26$	B1

13c	$8n - 2 = 278$ $8n = 278 + 2$ $8n = 280$ $n = 35$ Since n is a whole number, 278 is a term in the sequence.	M1 A1
14	Reflex angle AOC $= 360^\circ - 150^\circ$ $= 210^\circ$ Perimeter of major sector $= \frac{210^\circ}{360^\circ} \times 2\pi(6) + 6 + 6$ $= 7\pi + 12$	 M1 – addition of two radius M1 – Arc length A1
15	$\angle EDB = 120^\circ$ (opposite angles of //gram $\angle BDC$ $= 180^\circ - 120^\circ$ (Adjacent angles on a straight line) $= 60^\circ$ $\angle BCD$ $= 180^\circ - 60^\circ - 50^\circ$ (angle sum of triangle) $= 70^\circ$ Since angle $BDC \neq$ angle BCD , triangle BCD is not an isosceles triangle.	 M1 M1 A1
16a	$\frac{3}{6} = \frac{1}{2}$	B1
16b	$\frac{2}{6} = \frac{1}{3}$	B1
16c	$\frac{5}{6}$	B1
17a	$x^2 - 8x + 6$ $= (x - 4)^2 - (-4)^2 + 6$ $= (x - 4)^2 - 10$ $a = -4, b = -10$	 B2 B1 for one correct or $(x - 4)^2 + k$

17b	$(x-4)^2 = 10$ $x-4 = \sqrt{10}$ or $x-4 = -\sqrt{10}$ $x = \sqrt{10} + 4$ $x = -\sqrt{10} + 4$ $x = 7.16(2dp)$ $x = 0.84(2dp)$	M1 (allow ft, but b must be < 0) B1 (c.a.o)
18a	$(-4, 0)$	B1
18b	$y = -(0+4)(0-2)$ $y = 8$ Answer : $(0, 8)$	B1
18c	$x = \frac{-4+2}{2}$ $x = -1$	B1
18d	When $x = -1$, $y = -(-1+4)(-1-2)$ $y = 9$ Answer : $(-1, 9)$	B1
19a	Gradient $= \frac{4-0}{-2-2}$ $= -1$ Equation of PR is $y = -x + 2$. (shown)	M1 (finding gradient) A1 (conclusion must be seen. working to find y-intercept is not necessary).
19b		

	Draw the line $y = 2x - 1$: <table><tr><td>x</td><td>0</td><td>1</td><td>2</td></tr><tr><td>y</td><td>-1</td><td>0</td><td>3</td></tr></table> Plotting of at least 2 points within the graph : B1 Drawing a straight line passing through the points : B1 Answer : $x = 1, y = 1$. (B1) -> answer must be seen on graph.	x	0	1	2	y	-1	0	3					
x	0	1	2											
y	-1	0	3											
20a	<table><tr><th>Number of minutes (t)</th><th>Frequency</th></tr><tr><td>$0 \leq m < 10$</td><td>5</td></tr><tr><td>$10 \leq m < 20$</td><td>13</td></tr><tr><td>$20 \leq m < 30$</td><td>20</td></tr><tr><td>$30 \leq m < 40$</td><td>30</td></tr><tr><td>$40 \leq m < 50$</td><td>12</td></tr></table> Total : 80 students Answer : $30 \leq m < 40$	Number of minutes (t)	Frequency	$0 \leq m < 10$	5	$10 \leq m < 20$	13	$20 \leq m < 30$	20	$30 \leq m < 40$	30	$40 \leq m < 50$	12	
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$30 \leq m < 40$	30													
$40 \leq m < 50$	12													
20b	Mean $= \frac{5 \times 5 + 15 \times 13 + 25 \times 20 + 35 \times 30 + 45 \times 12}{80}$ = 28.875	M1 A1												
20c	$\frac{30 + 12}{80} \times 100\%$ $= \frac{42}{80} \times 100\%$ =52.5%	M1 A1												
20d	No, I do not agree. Histogram shows the comparison of data more clearly than pie chart.	B1 Accept other equivalent answers												
21a	Area of square = x^2 Perimeter of equilateral triangle = $117 - 4x$ Therefore, $x^2 = 117 - 4x$ $x^2 + 4x - 117 = 0(\text{shown})$	M1 - Attempt to find area of square and equate it to perimeter of equilateral triangle must be seen A1												

23c	$\pi(5)^2 + \pi(5)(13)$ $= 282.74$ $= 283\text{cm}^2 (3sf)$	M1 (1 mark awarded for finding curved surface area, allow ecf) A1
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