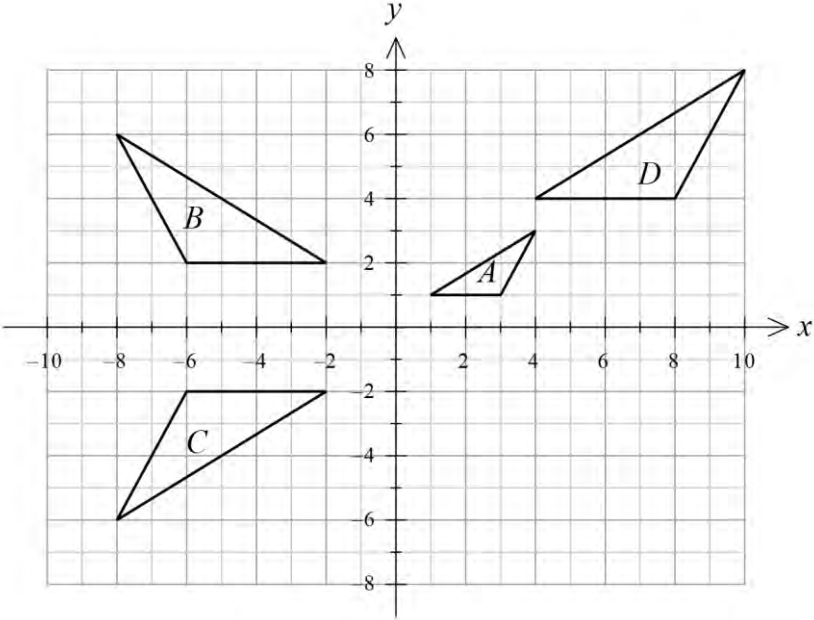


Question	Working	Answer	Mark	Notes
2 (a)	$75 = 3 \times 5 \times 5$ $90 = 2 \times 3 \times 3 \times 5$ $120 = 2 \times 2 \times 2 \times 3 \times 5$ or correct factor trees or <div> <div>3</div> <div>5</div> <div> <div>75</div> <div>25</div> <div>5</div> </div> <div> <div>90</div> <div>30</div> <div>6</div> </div> <div> <div>120</div> <div>40</div> <div>8</div> </div> </div>			M1 implied by correct answer
		15	2	A1
(b)	Both could sound together at 9.22 and LCM of 8 and 12 is 24 or 930 938 946 910 922 934 946			M1
		09 46 oe	2	A1
Total 4 marks				

Question	Working	Answer	Mark	Notes
3 (a)	$3a + 5a = 4 - 6$ oe			M1
		$-\frac{1}{4}$	2	A1
(b)	$-3p > 12$ or $-12 > 3p$			M1
		$p < -4$	2	A1
(c)		$w \leq 5$	1	B1 allow use of $x \leq 5$
(d)		$x \geq -1$ or $x > -1$ and $y \geq 0$ or $y > 0$	1	B1 allow $-1 < x < n$ where $n \geq 2$ allow $0 < y < m$ where $m \geq 6$
	$y = -2x + \dots$ or $y = \dots x + 4$			M1
		$y \leq -2x + 4$ or $y < -2x + 4$ oe	2	A1
Total 8 marks				

Question	Working	Answer	Mark	Notes
4 (a)		$x, 23 - x, 31 - x, 27 - x$ $x - 5, x - 10, x - 10$ 0	3	B1 B1 B1
(b)	$x + 56 = 75$			M1ft
		19	2	A1
(c)(i)	17		1	B1ft their "27" – " 10"
(ii)	44		1	B1ft $2x - "5" + "31" - "20$
(d)	$\frac{"19"-5}{49}$			M1 denominator of 49, numerator < 49
		$\frac{14}{49}$	2	A1ft oe (0.2857... allow 2dp truncated or rounded)
Total 9 marks				

Question	Working	Answer	Mark	Notes
5 (a)	Factorising into 2 brackets			M1 When multiplied out it must give at least 2 of the 3 terms correct
		$(x+6)(x-1)$	2	A1
(b)	$\frac{4(x+3)-5(2x-2)}{20}$ or $\frac{x+3}{5}-\frac{x-1}{2}$			M1
	$\frac{4x+12-10x+10}{20}$ or $\frac{2x+6-5x+5}{10}$			M1
		$\frac{-3x+11}{10}$	3	A1oe
Total 5 marks				

Question	Working	Answer	Mark	Notes
				
6 (a)		Triangle A	1	B1
(b)	$\begin{pmatrix} -2 & 0 \\ 0 & 2 \end{pmatrix} \begin{pmatrix} 1 & 3 & 4 \\ 1 & 1 & 3 \end{pmatrix}$			M1
	$\begin{pmatrix} -2 & -6 & -8 \\ 2 & 2 & 6 \end{pmatrix}$			A1
		Triangle B	3	A1
(c)		Triangle C	1	B1

Question	Working	Answer	Mark	Notes
(d)	$\mathbf{N} = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \begin{pmatrix} -2 & 0 \\ 0 & 2 \end{pmatrix} = \begin{pmatrix} -2 & 0 \\ 0 & -2 \end{pmatrix}$ <p>Or</p> <p>$A \rightarrow C$ is an enlargement with centre O and scale factor -2 so that</p> $\begin{pmatrix} 1 \\ 0 \end{pmatrix} \mapsto \begin{pmatrix} -2 \\ 0 \end{pmatrix} \text{ and } \begin{pmatrix} 0 \\ 1 \end{pmatrix} \mapsto \begin{pmatrix} 0 \\ -2 \end{pmatrix}$			M1 Allow M1 for $\begin{pmatrix} 0 & -2 \\ -2 & 0 \end{pmatrix}$
		$\begin{pmatrix} -2 & 0 \\ 0 & -2 \end{pmatrix}$	2	A1
(e)	Rotation 180° about any point			M1
		Triangle D	2	A1
(f)		Enlargement	1	B1
		SF $\frac{1}{2}$	1	B1
		centre $(-2, -2)$	1	B1
Total 12 marks				

Question	Working	Answer	Mark	Notes
7 (a)		$5 < t \leq 8$	1	B1
(b)	$2.5 \times 10 + 6.5 \times 8 + 9 \times 5 + 12.5 \times 3 + 22.5 \times 2$ (= 204.5)			M2 for at least 4 correct products added OR (M1 for use of a value within interval (incl. end points) for at least 4 products, which must be added).
	$\frac{"204.5"}{28}$			M1(dep) on at least M1
		awrt 7.3	4	A1
(c)		Bar drawn height 30 little squares	1	B1
(d)		$\frac{5}{35}$ oe	1	B1 (0.14(28571...) or 14(.28571)%)
Total 7 marks				

Question	Working	Answer	Mark	Notes
8	5010, 4990, 10100, 9900, 33.5, 34.5, 68.5, 67.5			M1 at least 1 from each row.
	Colin $\frac{10100}{67.5}$ or $\frac{10.1}{67.5}$			A1
	Jenny $\frac{4990}{34.5}$ or $\frac{4.99}{34.5}$			A1
	$\frac{\left(\frac{10100}{67.5} - \frac{4990}{34.5}\right) \times 60}{1000}$			M1
		0.2995 (km/h)	5	A1
Total 5 marks				

Question	Working		Answer	Mark	Notes
9 (a)	$8y^2 - \dots = 400$ or $\dots - 2x^2 = 400$ or $2y(4y - x) + \dots = 400$ or $\dots + x(2y - x) = 400$				M1
	$4y^2 - x^2 = 200$				A1cso
	$10y + 2x + 5 = 2y$ therefore $2y = 2x + 5$			3	B1cso
(b)	$(2x + 5)^2 - x^2 = 200$	$4y^2 - \left(\frac{2y - 5}{2}\right) = 200$			M1
	$3x^2 + 20x - 175 = 0$	$12y^2 + 20y - 825 = 0$			M1 Rearranging correctly to get a 3 term quadratic
	$(3x + 35)(x - 5) = 0$ $\frac{-20 \pm \sqrt{20^2 - 4 \times 3 \times -175}}{2 \times 3}$ $3\left[\left(x + \frac{20}{6}\right)^2 - \left(\frac{20}{6}\right)^2\right] - 175$	$(2y - 15)(6y + 55) = 0$ $\frac{-20 \pm \sqrt{20^2 - 4 \times 12 \times -825}}{2 \times 12}$ $12\left[\left(y + \frac{20}{24}\right)^2 - \left(\frac{20}{24}\right)^2\right] - 825$			M1 dep on M1 for solving their quadratic equation using any correct method - if factorising, allow brackets which expanded give 2 out of 3 terms correct (if using formula or completing the square allow one sign error and some simplification – allow as far as eg $\frac{-20 \pm \sqrt{400 + 2100}}{6}$ or eg $3\left(x + \frac{20}{6}\right)^2 - \frac{625}{3}$

	$x = 5$	$y = 7.5$			A1 one correct result for x or for y (ignore negative value for this mark)
	$y = \frac{2 \times "5" + 5}{2}$	$x = \frac{2 \times "7.5" - 5}{2}$			M1
			$x = 5$ and $y = 7.5$	5	A1 dep on M2 (positive values only)
Total 8 marks					

Question	Working	Answer	Mark	Notes
10 (a)	$3 \times \left(\frac{1}{3}\right)^3 - 7 \times \left(\frac{1}{3}\right)^2 + 5 \times \frac{1}{3} - 1$			M1
		$= 0, (3x - 1)$ is a factor	2	A1
(b)	$x^2 - 2x + 1$			M1
	$(x-1)(x-1)$			M1
		$x = \frac{1}{3}$ or 1	3	A1
(c)	$\frac{dy}{dx} = 9x^2 - 14x + 5$			M1
	$(x-1)(9x-5) = 0$			M1
		$1, \frac{5}{9}$		A1
	Substituting x values into $y = 3x^3 - 7x^2 + 5x - 1$			M1
		$(1, 0)$ $\left(\frac{5}{9}, \frac{32}{243}\right)$	5	A1
(d) (i)		5	1	B1ft (ft $\frac{dy}{dx}$)
(ii)	$y = "5"x - 1$			M1
		$y = 5x - 1$	2	A1oe
Total 13 marks				

Question	Working	Answer	Mark	Notes
11 (a)	SF $\frac{1}{5}$			B1 use or statement of the correct SF
	$\frac{1}{3}(\pi) \times 30^2 \times 100 - \frac{1}{3}(\pi) \times 6^2 \times 20$ oe			M1
		29760	3	A1
(b)		40800π	1	B1
(c)	$\frac{2}{3}\pi \times 30^3 + \dots$			M1
	$g = \text{height of small cone}$ $\frac{2}{3}\pi \times 30^3 +$ $\frac{1}{3}\pi \times 30^2 \times 108 - \frac{1}{3}\pi \times \left(\frac{30}{108}g\right)^2 \times g = 40800\pi$ or $0.02572g^3 = 9600$			M1 Condone $30k^2$ A1 Correct equation
	$g = 72$			A1
	$h = 30 + (108 - 72)$			M1
		awrt 66	6	A1
Alternate method				
	$V_{\text{hemisphere}} = \frac{2}{3}\pi \times 30^3 [=18000\pi]$			M1
	$V_{\text{frustum}} = 40800\pi - 18000\pi [=22800\pi]$			