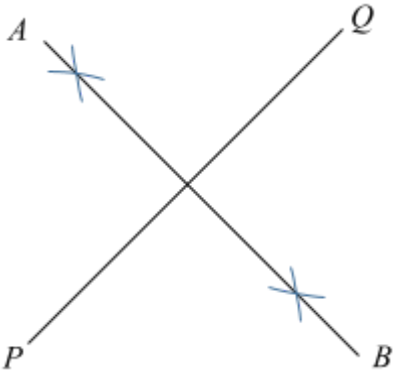
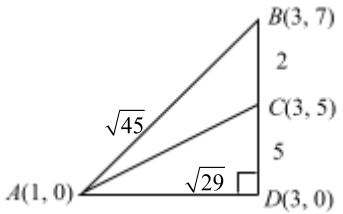
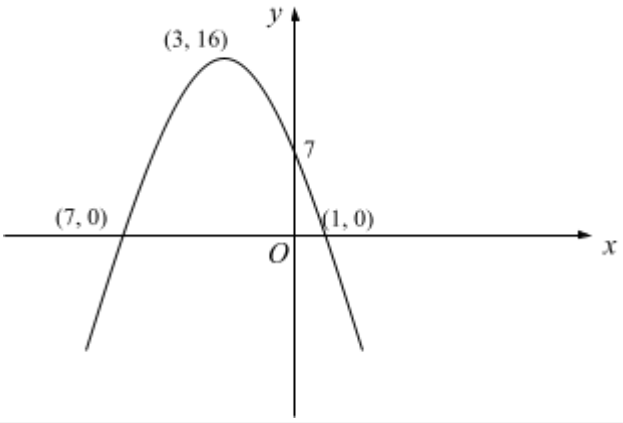
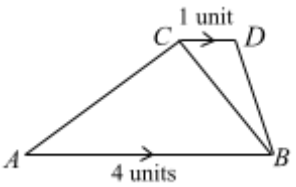
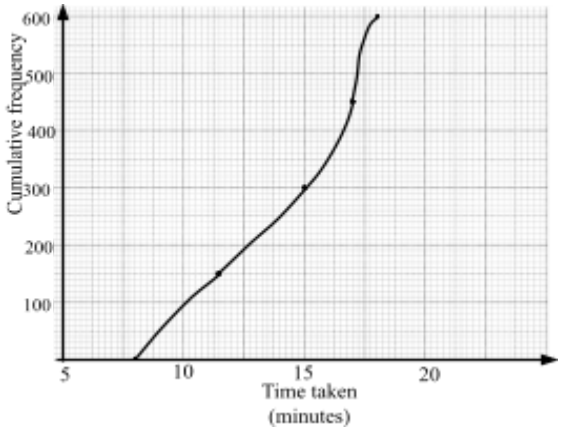
No.	Solution/Key Steps	Remarks	
1	By trial, $x = 1$; $\frac{x}{2} + \frac{2}{x} = 2.5$ $x = 2$; $\frac{x}{2} + \frac{2}{x} = 2$ $x = 3$ $\frac{x}{2} + \frac{2}{x} = 2\frac{1}{6}$ $x = 4$ $\frac{x}{2} + \frac{2}{x} = 2.5$ Min value = 2	B1	**1**
2	Mean is not a good indicator as there is an outlier.	B1 o.e.	**1**
3(a)	$\left(16^{12x^2}\right)^{\frac{5}{48x}} = \left(2^4\right)^{12x^2 \times \frac{5}{48x}}$ Ans: 2^{5x} or 32^x	M1 2^4 or $(16)^{\frac{5x}{4}}$ seen A1	**3**
(b)	Ans: 4%	A1	
4(i)	Ans: $2^2 \times 3 \times 7$	A1	
(ii)	$(2^2 \times 3 \times 7) \times 2^4 \times 3^2 \times 7^2$ or $(2^2 \times 3 \times 7) \times 2 \div (3 \times 7)$ $q = 2^2 \times 3^2 \times 2^3$ or $2 \div (3 \times 7)$ Ans: q = 7056 or 2/21	B1 $2^4 \times 3^2 \times 7^2$ or $2 \div (3 \times 7)$ soi B1	**3**
5	$1.1x = 900\,000$ $x = 818\,181.8$ Ans: 818 000	B1 oe B1 3 sf or better	**2**
6	$\frac{2}{3x-1} - \frac{3}{1+2x}$ $= \frac{2(1+2x)-3(3x-1)}{(3x-1)(1+2x)}$ $= \frac{5-5x}{(3x-1)(1+2x)}$ or $\frac{5(1-x)}{(3x-1)(1+2x)}$	B1 single fraction B1 accept deno. in expanded form	**2**
7	$1 - 0.55^2$ $= 0.6975$ Ans: 0.6975 or $\frac{279}{400}$	M1 alternative method A1	**2**
8(i)	$x^2y^4 - z^6$ $= (xy^2)^2 - (z^3)^2$ $= (xy^2 - z^3)(xy^2 + z^3)$	B1 Diff of 2 sq seen B1	

(ii)	$15a^2 - 6a + 20ab - 8b$ $= 3a(5a - 2) + 4b(5a - 2)$ $= (3a + 4b)(5a - 2)$	B1 Use of grouping B1	**4**
9(i)	Ans: $0.\dot{5} = \frac{5}{9}$	B1	
(ii)	$12.45 \le 12.5 < 12.55$ Ans: 12.45	B1	**2**
10	$F = \frac{k}{d^2}$ $F_2 = \frac{k}{(0.9d)^2}$ $= 1.23456 \frac{k}{d^2}$ Ans: % change = 23.5%	B1 variation relation seen B1 1.1^2 seen B1	**3**
11	$4(2x-5)^2 - 105 = 0$ $(2x-5)^2 = 26.25$ $(2x-5) = \pm\sqrt{26.25}$ $x = 5.06$ or -0.0617	M1 $(2x-5)^2$ as subject or solve by formula A1 both	**2**
12(i)		B1 correct line with constructions seen	
(ii)	$AP = AQ = BP = BQ$ $\therefore AB$ and PQ are diagonals of a rhombus. Diagonals of rhombus bisect each other at 90°.	B1 "rhombus" seen B1 "⊥ bisector" seen	**3**
13	 tan $BAD = \frac{7}{2}$, $\angle BAD = 74.05°$	M1 Using tangent ratio M1 Finding angles B1 Clear presentation	**4**

	$\tan CAD = \frac{5}{2}$ $\angle CAD = 68.20°$ $\angle BAC = 74.05° - 68.20°$ $= 5.9°$	A1 1 dp or better	
14(a)	Jane is correct, because $T_n = 2^{n-1}$ could also be a general term.	B1 with justification seen B1 formula seen	
b (i)	$M \cap E \neq \varphi$	B1 oe	
b (ii)	$P \subset M$	B1 oe	**4**
15		B1 max pt B1 All intercepts C1 Symm curve	**3**
16(a)	Let one of the ext. angle be $x°$ $x+2x+2x+3x+6(36)=360$ $x=18$ Largest int. angle $=180°-18°=162°$ Ans: 162°	M1 sum of exterior angle, oe. A1	
(b)	 $\frac{\text{Area of triangle } ACD}{\text{Area of triangle } ABC} = \frac{1}{4}$ Area of triangle $ACD = \frac{1}{4}(35) = 8\frac{3}{4}$ Ans: $8\frac{3}{4}$ or $8.75 cm^2$	B1 Diagram soi B1	**4**
17(a)	accn $= -\frac{40}{0.5}$ Ans: -80 km/h^2	B1	
(b)	0800 to 0830 Dist travelled $= \left(\frac{100+60}{2}\right) \times 0.5 = 40$ km 0830 to 0930	M1	**4**

	Dist travelled = 60 × 1 = 60 Ans: $p = 40$, $q = 100$	A1, A1	
18	$P\left(1+\frac{3}{100}\right)^5 - P > 10000$ $P\left(1.03^5 - 1\right) > 10000$ $P > 62784.85713$ Ans: \$62800	B1 $P\left(1+\frac{3}{100\times 4}\right)^{5\times 4}$ seen Accept equation form B1 B1	**3**
19(a)	$\angle PST = \angle QRT$ ($\angle$, same seg) $\angle SPT = \angle RQT$ ($\angle$, same seg) $\angle PTS = \angle QTR$ (vert opp $\angle$s) $\therefore \Delta PTS$ and ΔQTR are similar.	B2 for any 2 reasons seen B1 Statement seen. Only if 1st B2 awarded.	
(b)	From 1, $\frac{PT}{QT} = \frac{TS}{TR}$ Hence $QT \times ST = PT \times RT$	B1 award only if connection to (a) seen	**4**
20(i)	Vol of water = 0.1 × 0.03 × 0.04 × 90% Ans: 108 litres	B1 conversion or 90% seen B1	
(ii)	108 ÷ 1.6 Ans: 67 fish	B1 $\frac{\text{their water vol}}{\text{vol per fish}}$ B1	
(iii)	1600 + 200 × 4 Ans: 2 400 cm^3	B1	**5**
21(i)	Height R : Height L $= \sqrt[3]{330} : \sqrt[3]{1500}$ Ans: 1 : 1.657	B1 cube root seen B1 3 sf or better	
(ii)	Area R : Area L $= 1^2 : 1.657^2$ $= 1 : 2.744$ $\therefore \frac{x}{24} = \frac{2.744}{1}$ Ans: $x = 65.9$ cm^3	B1 Squaring seen B1 cao	**4**
22(a)	$\begin{pmatrix} 2.5 & 3.5 \\ 2.8 & 3.2 \end{pmatrix} \begin{pmatrix} 2 \\ 1 \end{pmatrix}$ Ans: $\begin{pmatrix} 8.5 \\ 8.8 \end{pmatrix}$	B1, B1	
(b)	The cost for two rice sets and one noodle set from Shop R and Shop S respectively.	B1 2 rice, 1 noodle seen B1 Shop R, Shop S seen	

(c)	Ans: 3 noodles, 3 rice	B1, B1	**6**
23(i)	Ans: (13, 150)	B1	
(ii)		B1 (13, 150) seen B1 Smooth curve	
(iii)	Agree. The spread of timing for the bottom 10% is 0.5 min whereas the spread in timing for the top 10% is 3 min.	B1 (their value of t at f=60) – 8 & 18 – (their value of t at f=540) seen B1 Spread/variance/consistency of timing must be seen. Reject terms of description: "Difference" / "Range"	**5**
24(i)	$x^2 - 4x = y - 6$ $x^2 - 4x + 2^2 = y - 6 + 2^2$ $(x-2)^2 = y - 2$ $x = 2 \pm \sqrt{y-2}$	B1 $+ 2^2$ seen B1, B1	
(ii)	$a^6 - 4a^3 - 32 = 0$ $(a^3)^2 - 4(a^3) - 32 = 0$ $(a^3 - 8)(a^3 + 4) = 0$ $a^3 = 8$ or $a^3 = -4$ Ans: $a = 2, -1.59$	M1 A1, A1	**6**