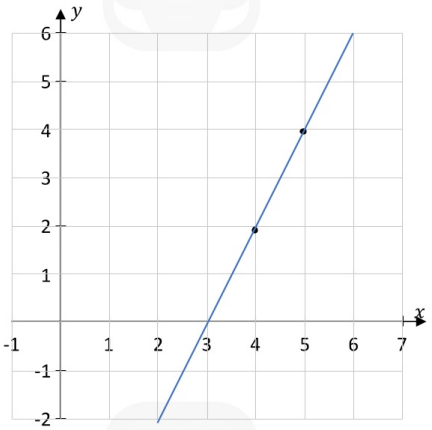
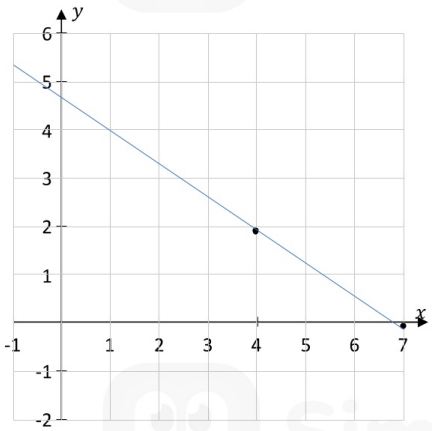
Question 1

Q1	Model Solution – 30 Marks	Marking Notes
(a) (i)	Slope of A(4,2) to B(1,8) $= \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{8-2}{1-4}$ $= -2$	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit:* • Work of merit *High Partial Credit:* • Correct formula fully substituted • Error(s) in substitution but finishes correctly *Full Credit:* • Correct answer without supporting work
(a) (ii)	Distance of (4,2) to (1,8) $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(1-4)^2 + (8-2)^2}$ $= \sqrt{(-3)^2 + (6)^2}$ $= \sqrt{9 + 36}$ $= \sqrt{45}$ or $3\sqrt{5}$ or $(6 \cdot 7\ldots.)$	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit:* • Work of merit *High Partial Credit:* • Correct formula fully substituted • Error(s) in substitution but finishes correctly *Full Credit:* • Correct answer without supporting work
Q1	**Model Solution – 30 Marks**	**Marking Notes**
(b)	$y - y_1 = m(x - x_1)$ $y - 7 = \frac{1}{3}[x - (-2)]$ $3(y-7) = 1(x+2)$ $3y - 21 = x + 2$ $x - 3y + 23 = 0$	**Scale 5C (0, 3, 4, 5)** *Low Partial Credit:* • Work of merit *High Partial Credit:* • Correct formula fully substituted • One error in substitution but finishes correctly • Answer not in required format *Full Credit (-1):* • $x - 3y + 23$

Q1	Model Solution – 30 Marks	Marking Notes
(c) (i) & (ii)	 	**Scale 5D (0, 2, 3, 4, 5)** *Low Partial Credit:* • Work of merit in (i) **or** (ii) • In(c)(i) line drawn with slope -2 **or** In(c)(ii) line drawn with slope $\frac{2}{3}$ *Mid Partial Credit:* • Work of merit in (i) **and** (ii) • One part correct *High Partial Credit:* • One part correct and work of merit in the other • In(c)(i) line drawn with slope -2 **and** In(c)(ii) line drawn with slope $\frac{2}{3}$ **Note**: Accept correct line segments outside the Range and Domain for Full Credit

Question 2

5	Model Solution – 30 Marks	Marking Notes
(a) & (b)	**(a)** 6 cm **(b)** $\text{Area} = \pi r^2$ $= \pi(6)^2$ $= 36\pi$ $= 113 \cdot 097$ $= 113 \cdot 10 \text{ cm}^2$	**Scale 10D (0, 4, 6, 8, 10)** *Low Partial Credit:* • Work of merit in either (a) **or** (b) e.g. work on diagram for (a) *Mid Partial Credit:* • One part correct *High Partial Credit:* • One part correct and work of merit in the other part

		Full Credit (-1): • Incorrect rounding • Incorrect or omitted units • Leaves answer in terms of π *Full Credit:* • Correct answers without supporting work
(c)	$\frac{\text{Area circle}}{\text{Area square}} = \frac{113 \cdot 10}{12 \times 12}$ $= 0 \cdot 7854 \times 100$ $= 78 \cdot 54[\%]$ $= 79[\%]$	**Scale 5C (0, 3, 4, 5)** *Low Partial Credit:* • Work of merit e.g. Finds Area of square *High Partial Credit:* • $\frac{113 \cdot 10}{12 \times 12} \times 100$ or $0 \cdot 7854$ *Full Credit (-1):* • Incorrect rounding *Full Credit :* • Correct answer without supporting work
5	**Model Solution – 30 Marks**	**Marking Notes**
(d)	$x^2 = 12^2 + 12^2$ $x^2 = 288$ $x = \sqrt{288}$ $x = 16.9705$ $\text{Radius} = \frac{16 \cdot 9705}{2}$ $= 8 \cdot 4853$ $= 8 \cdot 49$ **or** $x^2 = 6^2 + 6^2$ $x^2 = 72$ $x = \sqrt{72}$ $x = 8 \cdot 4853$ $x = 8 \cdot 49$	**Scale 5C (0, 3, 4, 5)** *Low Partial Credit:* • Work of merit e.g. Pythagoras Theorem formula written as $c^2 = a^2 + b^2$ *High Partial Credit:* • $x = \frac{\sqrt{288}}{2}$ or $\sqrt{72}$ with work *Full Credit (-1):* • Incorrect rounding *Zero Credit:* • No correct substitution and no formula
(e)	$\text{Circumference} = 2\pi r$ $= 2\pi(8 \cdot 49)$ $= 53 \cdot 344$ $= 53 \cdot 34 \text{ cm}$	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit:* • Work of merit *High Partial Credit:* • Correct formula fully substituted *Full Credit (-1):*

		• Incorrect rounding • Incorrect or omitted units *Full Credit :* • Correct answer without supporting work *Zero Credit:* • $53 \cdot 3$ without work

Question 3

4	Model Solution – 30 Marks	Marking Notes
(a) (i)	$S.S.S = (0 \cdot 7)(0 \cdot 7)(0 \cdot 7)$ $= 0 \cdot 343$ or $\frac{343}{1000}$ or $34 \cdot 3\%$	**Scale 5C (0, 3, 4, 5)** *Low Partial Credit:* • Work of merit e.g. $0 \cdot 7$ or $\frac{7}{10}$ written *High Partial Credit:* • Correct layout with full substitution e.g. $0 \cdot 7^3$ or $\left(\frac{7}{10}\right)^3$ *Full Credit:* • Correct answers without supporting work *Zero Credit:* • Probability greater than 1
(a) (ii)	$S.S.F = (0 \cdot 7)(0 \cdot 7)(0 \cdot 3)$ $= 0 \cdot 147$ Three arrangements $0 \cdot 147 \times 3 = 0 \cdot 441\left(\frac{441}{1000}\right)$	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit:* • Work of merit e.g. indicates three arrangements *High Partial Credit:* • Correct layout with correct substitution • Answer as $0 \cdot 147$ or $\frac{147}{1000}$ *Full Credit:* • Correct answers without supporting work *Zero Credit:* Probability greater than 1
(a) (iii)	Previous performance levels may affect future performance.	**Scale 5B (0, 3, 5)** *Partial Credit:* • Work of merit e.g. Partial explanation

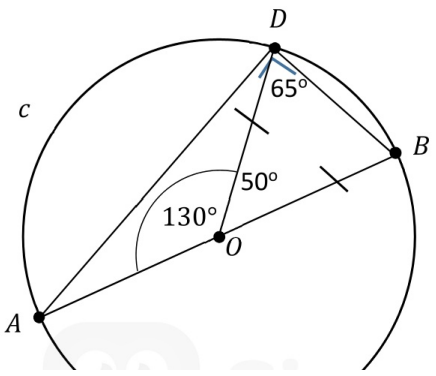
4	Model Solution – 30 Marks	Marking Notes
(b)	$\mu = \frac{\sum fx}{\sum f}$ $= \frac{4(0)+5(6)+4(8)+2(10)+3(12)+1(16)}{4+5+4+2+3+1}$ $= \frac{0+30+32+20+36+16}{19}$ $= \frac{134}{19} = 7 \cdot 05263$ $= 7 \cdot 05$ points scored	**Scale 10C (0, 4, 6, 10)** *Low Partial Credit:* • Work of merit e.g. Some addition of numerator or denominator terms • 134 and/or 19 without work *High Partial Credit:* • Correct formula fully substituted • One error and finishes correctly *Full Credit (-1):* • Incorrect rounding *Full Credit:* • Correct answer without supporting work

Question 4

Q1	Model Solution – 30 Marks	Marking Notes
(a) (i)	$m_{AC} = \frac{3-0}{0-(-2)} = \frac{3-0}{0+2} = \frac{3}{2}$	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit:* • Work of merit e.g. slope formula written down *High Partial Credit:* • Correct formula, with fully correct substitution or gets slope of BC *Full Credit:* • Correct answer without supporting work
(a) (ii)	**Answer**: AC is **not** perpendicular to BC **Justification**: $m_{BC} = -\frac{3}{5}$ Slope of $AC_{\perp}$ would be $-\frac{2}{3}$ **OR** $m_{AC} \times m_{BC} = \frac{3}{2} \times \frac{-3}{5} \neq -1$	**Scale 10C (0, 3, 7, 10)** *Zero Credit:* • Mention of $90°$ *Low Partial Credit:* • Work of merit e.g Correct Box Ticked • Slope formula written • Shows an understanding of relationship between perpendicular lines and their slopes *High Partial Credit:* • Answer correct and significant slope-related work presented. • Brings down m_{AC} from (a)(i) and calculates m_{BC} in (a)(ii) *Full Credit (-1):* • Fully correct work but box not ticked

		Note: Watch out for consistent work here
Q1	**Model Solution – 30 Marks**	**Marking Notes**
(b)	**(i)** $2 \times 9 = 18$ **(ii)** $y = 1$ **OR** $y - 1 = 0(x - 9)$ So $[y - 1 = 0]$	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit:* • Work of merit in any one part • Correct relevant formula written *High Partial Credit:* • Part (i) or (ii) correct *Full Credit:* • Correct answers without supporting work
(b) (iii)	$x = 0$: $0 + 4y - 13 = 0$ $4y = 13$ $y = \frac{13}{4}$ $y = \frac{13}{4}$ $N = \left(0, \frac{13}{4}\right)$	**Scale 10C (0, 3, 7, 10)** *Low Partial Credit* • Work of merit e.g. indicates $x = 0$ • Finds a point on the given line other than the intercepts *High Partial Credit* • Substitutes $x = 0$ in equation, accompanied by further work of merit • Substitutes $y = 0$ and correctly finds x *Full Credit (–1):* • Answer not given as a pair of co-ordinates

Question 5

Q6	Model Solution – 30 Marks	Marking Notes
	Diagram:  	**Note:** **Check Candidate's Diagram for meritorious work throughout this question**

		
(a) (i)	$90°$	**Scale 5A (0, 5)** • Hit or Miss
(a) (ii)	$2X = 130°$ so $X = 65°$ **OR** $\lvert\angle DOB\rvert = 180 - 130 = 50°$ $X = \frac{180-50}{2} = \frac{130}{2} = 65°$	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit:* • Any correct geometrical property mentioned or illustrated e.g. finds $50°$, or indicates that angle at B is also X *High Partial Credit:* • Geometrical property developed by correct substitution but X not calculated *Full credit:* • Accept correct answer without supporting work
Q6	**Model Solution – 30 Marks**	**Marking Notes**
(a) (iii)	**Minor arc**: $\frac{130}{360} \times 2\pi(18) = 13\pi$ [cm] **or** **Major arc**: $\frac{(360-130)}{360} \times 2\pi(18) = 23\pi$ [cm]	**Scale 10C (0, 3, 7, 10)** *Low Partial Credit:* • Work of merit • Correct relevant formula written • $\frac{130}{360}$ *High Partial Credit:* • Finds circumference • Fully correctly-substituted arc-length formula • Answer not in terms of π *Misreading(-1)* • If a different arc is correctly calculated e.g. $\frac{50}{360} \times 2\pi(18) = 5\pi$
(b)	**(i)** False *Reason*: Similar Triangles have the same shape but different measurements, thus a small and a large triangle could have angles the same but they are **not identical.** **(ii)** True *Reason*: Congruent Triangles are triangles where all the corresponding sides and interior angles are equal in measure	**Scale 10D (0, 3, 5, 8, 10)** *Low Partial Credit:* • Work of merit in either part e.g. True or False correct, or reason shows understanding of similarity or congruence *Mid Partial Credit:* • One part fully correct (answer and reason) • Work of merit in both parts

	(including area).This means all features **<u>are identical</u>** so angles must be the same	*High Partial Credit:* • One part fully correct (answer and reason) **and** work of merit in the other part

Question 6

Q8	Model Solution – 50 Marks	Marking Notes
(a) (i)	$V = \frac{2}{3}\pi(3^3) = 18\pi$ [m³]	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit* • Substitutes $r = 3$ into formula for volume of a sphere • Formula for volume of a hemisphere *High Partial Credit* • Formula correctly substituted • Answer not in terms of π • Correct answer without supporting work
(a) (ii)	$V = \pi(3^2)h = 36\pi$ So $h = 4$ m	**Scale 10D (0, 3, 5, 8,10)** *Low Partial Credit* • Formula for cylinder written with no substitution • Substitutes $r = 3$ into cylinder formula • Sets cylinder formula $= 36\pi$ *Mid Partial Credit* • Forms correct equation in h *High Partial Credit* • Correct equation in h **and** further significant work of merit in solving for h

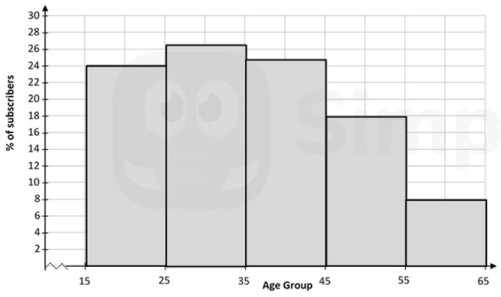
Q8	Model Solution – 50 Marks	Marking Notes
(b) (i)	$\tan A = \frac{47}{7 \cdot 5}$ $A = \tan^{-1}\left(\frac{47}{7 \cdot 5}\right)$ $A = 80 \cdot 93349°$ $A = 81°$[nearest degree]	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit:* • Correct trigonometric ratio • $a^2 = (7 \cdot 5)^2 + (47)^2$ *High Partial Credit:* • Fully substituted trigonometric ratio • Incorrect calculator mode but otherwise correct (only once in the paper) **Note:** Rad=1. Grad=90

(b) (ii)	$\frac{3}{7 \cdot 5} = \frac{x}{47}$ $x = 18{\cdot}8$ $k = 47 - 18{\cdot}8 = 28{\cdot}2$ m **OR** $\frac{k}{47} = \frac{7{\cdot}5-3}{7{\cdot}5} = \frac{4{\cdot}5}{7{\cdot}5}$ $k = \frac{4{\cdot}5}{7{\cdot}5} \times 47 = 28{\cdot}2$ m **OR** $\tan 81° = \frac{x}{3}$ $x = 3(\tan 81)$ $x = 18 \cdot 94125$ $k = 47 - 18 \cdot 94125$ $k = 28 \cdot 058$ $k = 28 \cdot 06$ m	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit* • One correct ratio of corresponding sides • Some correct substitution • Correct trigonometric ratio *High Partial Credit* • Correct equation in x • Error in setting up equation, but finishes correctly *Full Credit(–1)* • Correct value but no or incorrect unit **Note:** Rad $= 49 \cdot 433$ Grad$= 37 \cdot 248$

Q8	Model Solution – 30 Marks	Marking Notes
(c) (i)	Area = $\pi\ (50^2) = 7853{\cdot}98$ … $= 7854$ km^2 [nearest km^2]	**Scale 5B (0, 2, 5)** *Partial Credit* • Area of circle formula written *Full Credit(–1)* • Incorrect rounding *Full Credit:* • Correct answer without supporting work
(c) (ii)	$27\ Nautical\ miles = 50$ km $1\ Nautical\ mile = \frac{50}{27}$ $= 1 \cdot 8518$ … $= 1 \cdot 852$ [km]	**Scale 10B (0, 5, 10)** *Partial Credit* • $\frac{50}{27}$ • $\frac{27}{50}$, and finishes correctly *Full Credit (–1)* • Correct value, but incorrect rounding *Full Credit:* • Correct answer without supporting work

Question 7

(a) (i)



Scale 15C (0, 5, 10, 15)
Low Partial Credit:
Work of merit
- One correct column height indicated

High Partial Credit:
Significant Work
- Three correct columns drawn
- All correct height columns drawn but gaps between them

(a) (ii)

$$\frac{27 + 25 + 16}{100} = 68\%$$

$$68\% \times 1000 = 680 \text{ people}$$

or

$$270 + 250 + 160 = 680$$

Scale 5C (0, 2, 3, 5)
Low Partial Credit:
Work of merit
- Work with any Two of $27, 25, 16$

High Partial Credit:
Significant Work
- Works to $27 + 25 + 16 = 68$

Full Credit:
- Correct answer without supporting work

(a) (iii)

The 25 to 35 age group

Scale 5B (0, 2, 5)
Partial Credit:
Work of merit
- Median interpreted as 50%, Middle or Half

Full Credit:
- Correct answer without supporting work

(a) (iv)

$$[(24 \times 20) + (27 \times 30) + (25 \times 40) + (16 \times 50) + (8 \times 60)] \div 100$$

$$= \frac{3570}{100}$$

$$= 35{\cdot}7$$

Scale 10C (0, 3, 7, 10)
Low Partial Credit:
Work of merit
- Calculates a mid-interval value
- Effort at adding data
- 24×20 or equivalent
- Division by 100

High Partial Credit:
Significant Work
- Formula substituted correctly but not evaluated
- Consistent incorrect mid interval values, finished correctly
- One error and finishes correctly

Full Credit:
- Correct answer without supporting work

(b) (i)	$\frac{1}{\sqrt{540}} = 0{\cdot}043 = 4{\cdot}3\%$	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit:* Work of merit • Writes $\frac{1}{\sqrt{n}}$ • Reference to multiplication by 100 *High Partial Credit:* Significant Work • Correct formula fully substituted $\frac{1}{\sqrt{540}}$ • Answer as 0·043 *Full Credit:* • Correct answer without supporting work
(b) (ii)	$\hat{p} = \frac{372}{540} = 0{\cdot}6888 = 68{\cdot}9\%$ 95% confidence interval $=$ $\left[\hat{p} - \frac{1}{\sqrt{n}}\ ,\quad \hat{p} + \frac{1}{\sqrt{n}}\right]$ $[(68{\cdot}9 - 4{\cdot}3), (68{\cdot}9 + 4{\cdot}3)]$ $[64{\cdot}6\%\ ,\ \ 73{\cdot}2\%]$	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit:* Work of merit • Writes answer from (b)(i) in this part • $\hat{p} = \frac{372}{540}$ • $\hat{p} \pm \frac{1}{\sqrt{n}}$ • $\hat{p} \pm 1{\cdot}96\sqrt{\frac{p(1-p)}{n}}$ *High Partial Credit:* Significant Work • One boundary formed $(68{\cdot}9 - 4{\cdot}3$ or $68{\cdot}9 + 4{\cdot}3)$ • Correct answer without supporting work
(b) (iii)	$H_0 =$ the Netflix share of the market has not changed. or $\quad (H_0{:}\ p\ =\ 65\%)$ $H_1 =$ the Netflix share of the market has changed or $\quad (H_1{:}\ p\ \neq\ 65\%)$ $65\% \in [64{\cdot}6\%,\ \ 73{\cdot}2\%]$ (Fail to reject H_0 and) conclude that the Netflix share of the market has not changed	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit:* Work of merit • Any one of H_0, H_1, or Confidence interval written *High Partial Credit:* Significant Work • H_0, H_1, and reference to C.I. • Conclusion (from correct work) not in context

Question 8

Q8	Model Solution – 50 Marks	Marking Notes
(a) (i)	$l^2 = 1 \cdot 4^2 + 3^2$ $l^2 = 10 \cdot 96$	**Scale 10C (0, 4, 5, 10)** Accept correct answer without units

	$l = \sqrt{10 \cdot 96}$ $l = 3 \cdot 31058 \ldots$ $l = 3 \cdot 3$ [m]	*Low Partial Credit:* • Correct relevant formula • Use of Cosine Rule would merit at most L.P.C. *High Partial Credit:* • Correct formula fully substituted • One error in substitution and finishes correctly *Full Credit (-1):* • Apply a * for no or incorrect rounding
(a) (ii)	$Tan\ A = \frac{3}{1 \cdot 4}$ $A = 64 \cdot 983 \ldots$ $A = 65[°]$ Or similar using l=3·3	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit:* • Work of merit *High Partial Credit:* • $Tan\ A = \frac{3}{1 \cdot 4}$ or similar • Finds $\angle GFH$ using trigonometry (25°) *Full Credit (-1):* • Apply a * for no or incorrect rounding
(a) (iii)	Answer: **No** $Tan\ A = \frac{1 \cdot 5}{1 \cdot 4}$ $A = 46 \cdot 974 \ldots$ $A = 47\ [°]$ $47° \neq \frac{1}{2}(65°)$	**Scale 5C (0, 2, 3, 5)** *Low Partial Credit:* • Work of merit, for example, correct box ticked • 1·5 or 32·5 written *High Partial Credit:* • Answer as 47° *Full Credit (-1):* • Correct box not ticked • No conclusion

Q8	Model Solution – 50 Marks	Marking Notes
(b) (i)	$\frac{12}{\text{Sin}\ \theta} = \frac{10}{\text{Sin}\ 37}$ $\text{Sin}\ \theta = \frac{12\ \text{Sin}\ 37}{10}$ $\text{Sin}\ \theta = 0{\cdot}7222$ $\theta = 46{\cdot}234..$ $\theta = 46°$	**Scale 10C (0, 4, 5, 10)** *Low Partial Credit:* • Work of merit, for example, sine rule formula *High Partial Credit:* • Correct formula fully substituted *Full Credit (-1):* • Apply a * for no or incorrect rounding
(b) (ii)	$\lvert CE\rvert^2 = 22^2 + 11 \cdot 8^2$	**Scale 10C (0, 4, 5, 10)** *Low Partial Credit:*

	$-2(22)(11\cdot 8)\cos 110$ $\lvert CE\rvert^2 = 800\cdot 816\ldots$ $\lvert CE\rvert = 28\cdot 298\ldots$ $\lvert CE\rvert = 28\cdot 3$ cm	• Work of merit, for example, cosine rule formula *High Partial Credit:* • Correct formula fully substituted *Full Credit (-1):* • Apply a * for no or incorrect rounding • Apply a * for incorrect units
(b) (iii)	Area $= \frac{1}{2}(22)(11\cdot 8)\sin 110$ $= 121\cdot 972\ldots$ Total area $= 2\times 121\cdot 972\ldots$ $= 243\cdot 944\ldots$ $= 244$ [cm^2]	**Scale 10C (0, 4, 5, 10)** *Low Partial Credit:* • Work of merit, for example, area of triangle formula *High Partial Credit:* • Area formula fully substituted • Area of triangle CEF given as answer *Full Credit (-1):* • Apply a * for no or incorrect rounding