| Sec | Section A(1) [35] | | [35] |
|-----|---|---|------|
| 1. | $\frac{y^4}{y^4}$ | | |
| | $=\frac{x^{3}y^{6}}{y^{4}}$ $=\frac{x^{3}}{y^{4-(-6)}}$ $=\frac{x^{3}}{y^{10}}$ [| | |
| | $=\frac{x}{y^2}$ | το | [3] |
| 2. | (a) | $a^2 - 2a - 3$ = $(a + 1)(a - 3)$ | [1] |
| | (b) | $ab^{2} + b^{2} + a^{2} - 2a - 3$ = $ab^{2} + b^{2} + (a + 1)(a - 3)$ = $b^{2}(a + 1) + (a + 1)(a - 3)$ | |
| | | $= (a+1)(b^2+a-3)$ | [2] |
| 3. | (a) | 200 | [1] |
| | (b) | 123 | [1] |
| | (c) | 123.4 | [1] |
| 4. | The | median = 1 | |
| | The | mode = 2 | |
| | The | standard deviation = 0.889 | [3] |
| 5. | (a) | 2(3m+n) = m+7 | |
| | | 6m + 2n = m + 7 | |
| | | $n = \frac{7-5m}{2}$ | [2] |
| | (b) | The decrease in the value of $n = 5$ | [2] |
| 6. | (a) | The selling price of the toy | |
| | | = 255(1 - 40%) | |
| | | = \$153 | [2] |
| | (b) | Let x be the cost of the toy. | |
| | | (1+2%)x = 153 | |
| | | x = 150 | |
| | | The cost of the toy is \$150. | [2] |

MATH CONCEPT education © copyright

DSE.Math.Core.2014.Paper.1_Suggested.Solution_1/9

| 7. | (a) | f(2) = -33 | | |
|----|-------------|--|---|-----|
| | | $4(2)^2 3 - 5(2)^2 2 - 18(2) + c = -33$ | | |
| | | c = -9 | | |
| | | f(-1) | | |
| | | $= 4(-1)^3 - 5(-1)^2 - 18(-1) - 9$ | | |
| | | = 0 | | |
| | | $\therefore x + 1$ is a factor of $f(x)$. | | [3] |
| | (b) | f(x) = 0 | | |
| | | $4x^3 - 5x^2 - 18x - 9 = 0$ | | |
| | | $(x+1)(4x^2 - 9x - 9) = 0$ | | |
| | | (x+1)(x-3)(4x+3) = 0 | | |
| | | $x = -1, x = 3 \text{ or } x = -\frac{3}{4}$ | | |
| | | Note that -1 , 3 and $-\frac{3}{4}$ are rational numbers | | |
| | | . The claim is agreed. | | [2] |
| 8. | (a) | <i>P</i> ′ (5,3) | | |
| | | Q'(-19,-7) | | [2] |
| | (b) | m_{PQ} | | |
| | | $=\frac{5+7}{-3-2}$ | | |
| | | | | |
| | | $=-\frac{12}{5}$ | | |
| | | $m_{P'O'}$ | | |
| | | 3 + 7 | | |
| | | $=\frac{1}{5+19}$ | | |
| | | $=\frac{5}{12}$ | | |
| | | $\therefore m_{PQ} \times m_{P'Q'} = -1.$ | | |
| | | $\therefore PQ \perp P'Q' .$ | | [3] |
| 9. | (a) | In $\triangle ABC$ and $\triangle BDC$, | | |
| | | $\angle BAC = \angle DBC$ | (given) | |
| | | $\angle ACB = \angle BCD$ | (common \angle) | |
| | | $\angle ABC = \angle BDC$ | $(\angle \operatorname{sum of} \Delta)$ | |
| | | $\Delta ABC \sim \Delta BDC$ | (AAA) | [2] |
| | | | | 1 |

MATHCONCEPT education © copyright

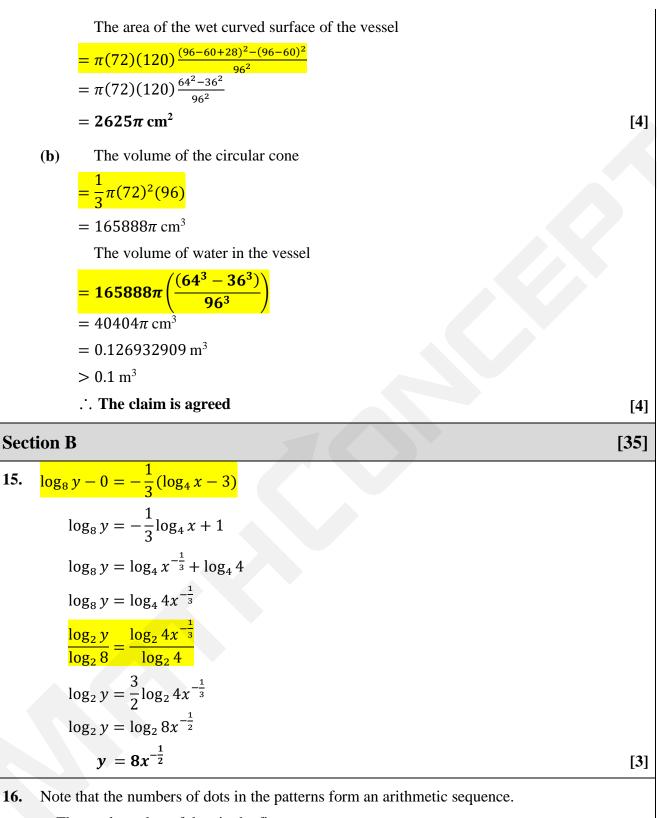
DSE.Math.Core.2014.Paper.1_Suggested.Solution_2/9

| | (b) | By (a), $\frac{CD}{BC} = \frac{BC}{AC}$ | |
|-----|--------------|---|------|
| | | CD = 16 cm | |
| | | $BD^2 + CD^2$ | |
| | | $= 12^{2} + 16^{2}$ | |
| | | $= 20^2$ $= BC^2$ | |
| | | $\therefore \Delta BCD$ is a right-angled triangle. | [3] |
| Sec | tion A | A(2) | [35] |
| 10. | (a) | The distance of car A from town X at 8:15 in the morning | |
| | | $=\frac{45}{120}(80)$ | |
| | | = 30 km | [2] |
| | (b) | Suppose that car A and car B first meet at the time <i>t</i> minutes after 7:30 in the morning. | |
| | | $\frac{t}{120} = \frac{44}{80}$ | |
| | | t = 66 | |
| | | Car A and car B first meet at 8:36 in the morning. | [2] |
| | (c) | During the period 8:15 to 9:30 in the morning, car B travels 36 km while car A travels more than 36 km. | |
| | | \therefore The average speed of car A is greater than that of car B. | |
| | | . The claim is disagreed. | [2] |
| 11. | (a) | The range = 73 thousand dollars | |
| | | The inter-quartile range | |
| | | = 63 - 42 | |
| | | = 21 thousand dollars | [2] |
| | (b) | The mean of the prices of the remaining paintings in the art gallery | |
| | | (33)(53) - 32 - 34 - 58 - 59 | |
| | | $=\frac{33-4}{1566}$ | |
| | | $=\frac{1303}{29}$ | |
| | | = 54 thousand dollars | |
| | | Note that 32 and 34 are less than 55. | |
| | | Also note that 58 and 59 are greater than 55. | |
| | | The median of the prices of the remaining paintings in the art gallery | |
| | | = 55 thousand dollars | [3] |
| | | | |

| 12. | (a) | The radius of <i>C</i> | | |
|-----|-------------|--|------|--|
| | | $=\sqrt{(6-0)^2 + (11-3)^2}$ | | |
| | | = 10 | | |
| | | : The equation of C is $x^2 + (y - 3)^2 = 10^2$ [2] | | |
| | (b) | (i) Let (x, y) be the coordinates of <i>P</i> . | | |
| | | $\sqrt{(x-0)^2 + (y-3)^2} = \sqrt{(x-6)62 + (y-11)^2}$ | | |
| | | 3x + 4y - 37 = 0 | | |
| | | \therefore The equation of Γ is $3x + 4y - 37 = 0$ | [2] | |
| | | (ii) Γ is the perpendicular bisector of the line segment <i>AG</i> . | [1] | |
| | | (iii) The perimeter of the quadrilateral <i>AQGR</i> | | |
| | | = 4(10) | | |
| | | = 40 | [2] | |
| 13. | (a) | Let $f(x) = px^2 + q$ | | |
| | | $\begin{cases} 4p + q = 59 \\ 49p + q = -121 \end{cases}$ | | |
| | | | | |
| | | Solving, we have $p = -4$ and $q = 75$ $\therefore f(x) = 75 - 4x^2$ | | |
| | | $\therefore f(6) = -69.$ | [4] | |
| | | | [4] | |
| | (b) | By (a), we have $a = -69$. Since $f(x) = 75 - 4x^2$, we have $f(-6) = f(6)$. | | |
| | | So, we have $b = -69$. | | |
| | | AB | | |
| | | = 6 - (-6) | | |
| | | = 12 | | |
| | | The area of $\triangle ABC$ | | |
| | | $=\frac{(12)(69)}{2}$ | | |
| | | = 414 | E 41 | |
| | | | [4] | |
| 14. | (a) | The slant height of the circular cone | | |
| | | $=\sqrt{72^2+96^2}$ | | |
| | | = 120 cm | | |

MATH CONCEPT education © copyright

DSE.Math.Core.2014.Paper.1_Suggested.Solution_4/9



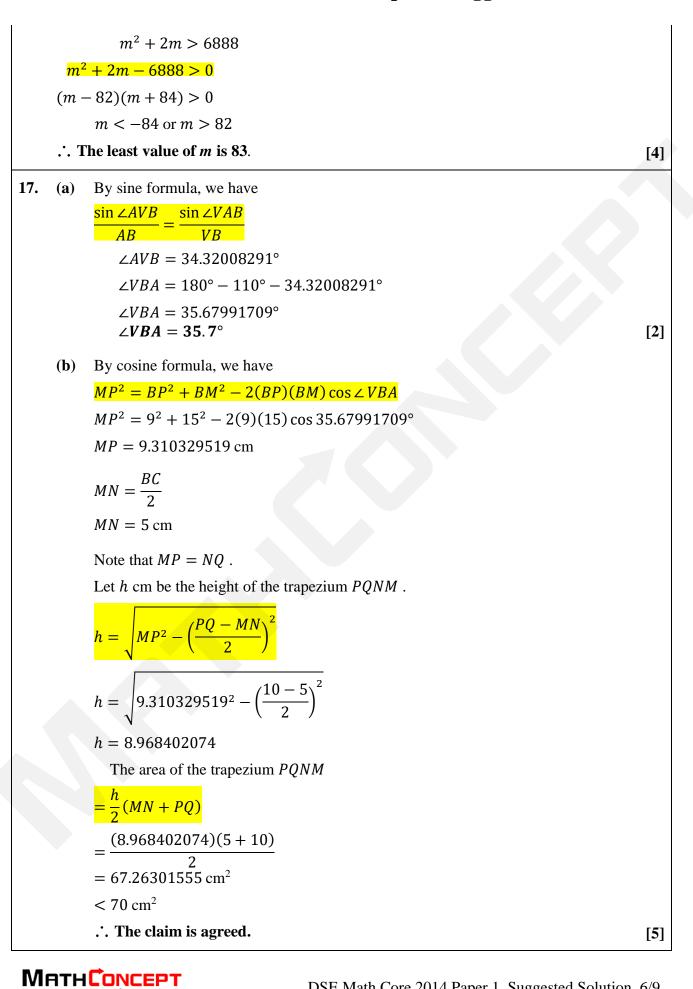
The total number of dots in the first *m* patterns

$$= 3 + 5 + 7 + \dots + (2m + 1)$$
$$= \frac{m}{2} (3 + (2m + 1))$$

$$= m^2 + 2m$$

MATHCONCEPT education © copyright

DSE.Math.Core.2014.Paper.1_Suggested.Solution_5/9



education © copyright DSE.Math.Core.201

| 18. (a) | m_{L_2} | |
|----------------|--|-----|
| 100 (u) | - | |
| | $=\frac{90-0}{45-180}$ | |
| | $=-\frac{2}{3}$ | |
| | The equation of L_2 is: | |
| | $y - 90 = -\frac{2}{3}(x - 45)$ | |
| | 2x + 3y - 360 = 0 | |
| | $\therefore \text{The system of inequalities is} \begin{cases} 6x + 7y \le 900\\ 2x + 3y \le 360\\ x \ge 0\\ y \ge 0 \end{cases}$ | [4] |
| (b) | Let x and y be the numbers of wardrobes X and Y produced that month respectively. | |
| | Now, the constraints are | |
| | $\begin{cases} 6x + 7y \le 900 \\ 2x + 3y \le 360 \end{cases}$, where x and y are non-negative integers. | |
| | Denote the total profit on the production of wardrobes by P . | |
| | P=440x+665y | |
| | Note that the vertices of the shaded region in Figure 7 are the points | |
| | (0,0), $(0,120)$, $(45,90)$ and $(150,0)$. | |
| | For $(0,0)$, $P = (440)(0) + (665)(0) = 0$. | |
| | For $(0, 120)$, $P = (440)(0) + (665)(120) = 79800$. | |
| | For $(45,90)$, $P = (440)(45) + (665)(90) = 79650$. | |
| | For $(150,0)$, $P = (440)(150) + (665)(0) = 66000$. | |
| | . The greatest possible total profit is \$79800. | |
| | The claim is disagreed. | [4] |
| 19. (a) | The required probability | |
| | $= \frac{1}{6} + \left(\frac{5}{6}\right) \left(\frac{5}{6}\right) \left(\frac{1}{6}\right) + \left(\frac{5}{6}\right) \left(\frac{5}{6}\right) \left(\frac{5}{6}\right) \left(\frac{5}{6}\right) \left(\frac{1}{6}\right) + \cdots$ $= \frac{\frac{1}{6}}{\frac{1}{6}}$ | |
| | $\frac{1-\frac{25}{36}}{6}$ | |
| | $=\frac{1}{11}$ | [3] |
| | | |

MATH CONCEPT education © copyright

(b) (i) Suppose that the player of the second round adopts Option I.
The probability of getting 10 tokens

$$= \frac{(1)\left(\frac{1}{8}\right)}{=\frac{1}{8}}$$
The probability of getting 5 tokens

$$= \frac{7(P_{2}^{2})}{\frac{3}{8^{2}}}$$

$$= \frac{7}{32}$$
The expected number of tokens got

$$= (10)\left(\frac{1}{8}\right) + (5)\left(\frac{2}{32}\right)$$

$$= \frac{75}{32}$$
[4]
(ii) Suppose that the player of the second round adopts Option 2.
The probability of getting 50 tokens

$$= (1)\left(\frac{1}{8}\right)\left(\frac{1}{8}\right)$$

$$= \frac{1}{64}$$
The probability of getting 10 tokens

$$= \frac{(6)(P_{2}^{2})}{8^{3}}$$

$$= \frac{9}{128}$$
The probability of getting 5 tokens

$$= (2)\left(\frac{1}{8}\right)^{2}\left(\frac{1}{8}\right) + (6)\left(\frac{1}{8}\right)^{2}\left(\frac{2}{8}\right) + \left(\frac{7}{32}\right)\left(\frac{2}{8}\right)$$

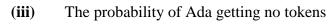
$$= \frac{21}{256}$$
The expected number of tokens got

$$= (50)\left(\frac{1}{64}\right) + (10)\left(\frac{9}{122}\right) + (5)\left(\frac{21}{256}\right)$$

$$= \frac{485}{256}$$
Note that $\frac{72}{82} > \frac{495}{256}$

MATH CONCEPT education © copyright

DSE.Math.Core.2014.Paper.1_Suggested.Solution_8/9



$$= 1 - \left(\frac{6}{11}\right) \left(\frac{1}{8} + \frac{7}{32}\right)$$
$$= \frac{13}{16}$$
$$< 0.9$$
$$\therefore$$
 The claim is incorrect.

[3]

