

2019 O level E-Math (4048) - Paper 1 Answer key

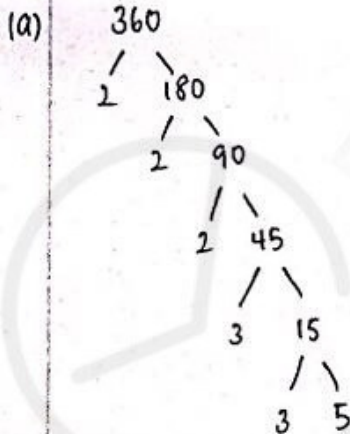
Q1. 350 #

Q2. The total spending in 2011 is about twice the total spending in 2006, however, the size of the credit card in 2006 is not two times the size of the credit card in 2011.

Q3.
(a) $(x^6)^{\frac{2}{3}} = x^{6 \times \frac{2}{3}}$
 $= x^4$ #

(b) $3^a = 3^7 + 3^7 + 3^7$
 $3^a = 3^7 (1+1+1)$
 $3^a = 3^7 (3^1)$
 $3^a = 3^8$
 $\therefore a = 8$ #

Q4.



$360 = 2^3 \times 3^2 \times 5$

(b) $\frac{360p}{q}$
 $\frac{2^3 \times 3^2 \times 5 \times p}{q} \therefore p = 3, q = 5$ # #

Q5. $3200 \left(1 + \frac{r}{100}\right)^6 = 3890$
 $\left(1 + \frac{r}{100}\right)^6 = 1.2156$
 $1 + \frac{r}{100} = 1.03307$
 $\frac{r}{100} = 0.033078$
 $r = 3.3078$
 $= 3.31$ (3sf) #

Q6. $\frac{1}{2x-3} - \frac{3}{3x-1} = \frac{3x-1 - 3(2x-3)}{(3x-1)(2x-3)}$
 $= \frac{3x-1-6x+9}{(3x-1)(2x-3)}$
 $= \frac{8-3x}{(2x-3)(3x-1)}$ #

Q7.
(a) $8+9+3 = 20$
 $\frac{8+9}{20} = \frac{17}{20}$ #

(b) $\frac{8}{20-x} = \frac{2}{3}$
 $24 = 40 - 2x$
 $-16 = -2x$
 $x = 8$ #

Q8. $3p^2 + p - 10 = 0$
 $(3p-5)(p+2) = 0$
 $p = \frac{5}{3}$ or $p = -2$ # #

$3p - 5$	$-5p$
$p + 2$	$+6p$
$3p^2 - 10$	
	p

Q9.
(a) $33\% < \frac{1}{3}$

(b) $6 \leq 2x + 11 < 19$
 $-5 \leq 2x < 8$
 $-2.5 \leq x < 4$ #

Q10.

(a) $P = kQ^3$

(2) $= k\left(\frac{1}{3}\right)^3$

$k = 54$

$$P = 54Q^3$$

$$= 54\left(\frac{1}{6}\right)^3$$

$$= \frac{1}{4} \#$$

(b)

$P_1 = Q^3$

$P_2 = \left(\frac{1}{2}Q\right)^3$

$P_2 = \frac{1}{8}Q^3$

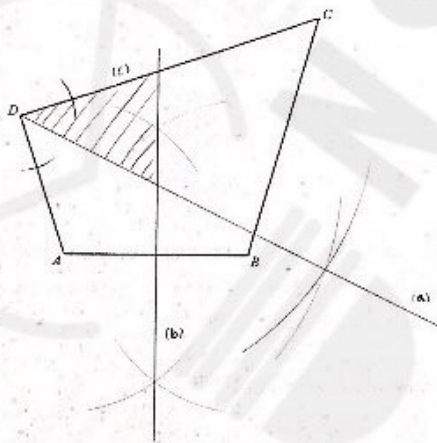
$\therefore m = \frac{1}{8} \#$

Q11.

(a) $x^2 - y^4 = x^2 - (y^2)^2$
 $= (x - y^2)(x + y^2) \#$

(b) $6ab + 1 - 3a - 2b$
 $= 6ab - 3a + 1 - 2b$
 $= 3a(2b - 1) - (2b - 1)$
 $= (3a - 1)(2b - 1) \#$

Q12.



Q13.

(a) $\vec{OB} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$ $\vec{AB} = \begin{pmatrix} -3 \\ 7 \end{pmatrix}$

$\therefore \vec{AB} = \vec{OB} - \vec{OA}$

$\vec{OA} = \vec{OB} - \vec{AB}$

$= \begin{pmatrix} 5 \\ -2 \end{pmatrix} - \begin{pmatrix} -3 \\ 7 \end{pmatrix}$

$= \begin{pmatrix} 8 \\ -9 \end{pmatrix} \#$

(b)

$\sqrt{(-3)^2 + (7)^2} = 7.61577$
 $= 7.62 \text{ units (3s.f.)} \#$

Q14.

(a) $360^\circ - 317^\circ = 43^\circ$

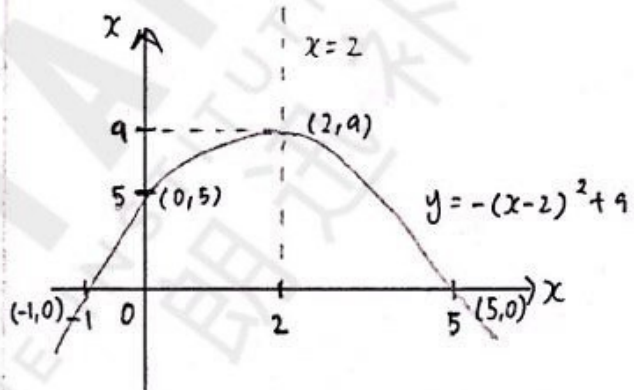
$\therefore 180^\circ - 43^\circ = 137^\circ \#$

(b) $137^\circ - 55^\circ = 82^\circ$

$180^\circ - 82^\circ = 98^\circ$

$360^\circ - 98^\circ = 262^\circ \#$

Q15.



Q16.

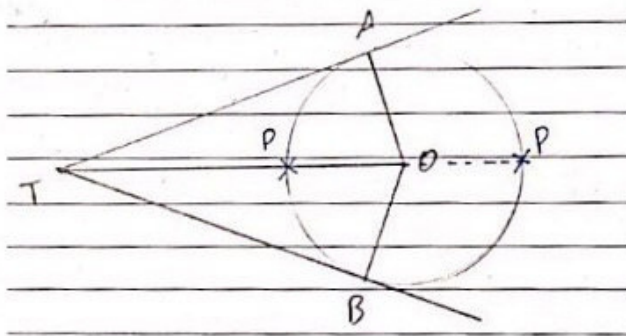
(a) $\angle OAT = \angle OBT = 90^\circ$ (tangent \perp radius) (R)

$TA = TB$ (common side) (H)

$OA = OB$ (radius) (S)

$\therefore \triangle OAT$ is congruent to $\triangle OBT$ (RHS)

(b)



Q17.

(a) 3.5 km/h #

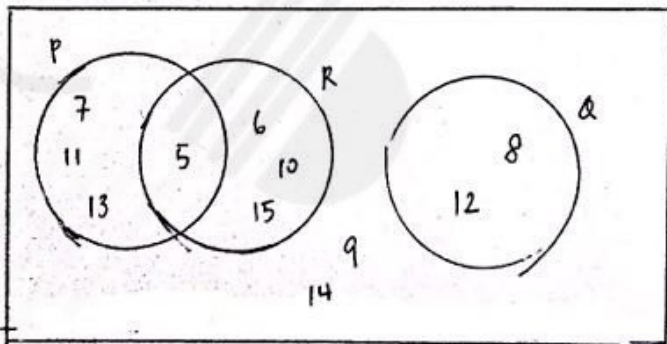
(b)(i) 12.24 p.m. #

(ii) 8 km #

(c) $\frac{8 \text{ km}}{1 \text{ h}} = \frac{8000 \text{ m}}{3600 \text{ s}}$
 $= 2.222$
 $= 2.22 \text{ m/s (3 s.f.)}$

Q18.

(a) $R = \{5, 6, 10, 15\}$ #



(b) correct: $R \cap Q = \emptyset$
 $16 \notin P$

Q19.

$A : B : D = 7 : 5 : 2$
 $A : B : D = (3 : 2 : 1) \times 2$
 $= 6 : 4 : 2$

$\therefore 1u = \$60$
 $6u = \$360$ #

Q20

(a) $\frac{4}{10} = \frac{x}{30}$

$120 = 10x$

$x = 12 \text{ cm}$ #

(b) $3\sqrt[3]{\frac{125}{500}} = \frac{4}{x}$

$4 \div \sqrt[3]{\frac{125}{500}} = x$

$x = 6.349$

$= 6.35 \text{ cm (3 s.f.)}$ #

Q21.

(a) $R = \begin{pmatrix} 24 & 14 \\ 29 & x \\ 20 & 15 \end{pmatrix}$ #

(b) $T = QR$
 $= \begin{pmatrix} 24 & 14 \\ 29 & x \\ 20 & 15 \end{pmatrix} \begin{pmatrix} 10 & 8 \\ 40 & 45 \end{pmatrix}$
 $= \begin{pmatrix} 800 & 722 \\ 290+40x & 232+45x \\ 800 & 835 \end{pmatrix}$ #

(c) $290 + 40x + 70 = 800$
 $x = 11$

$P = \{5, 7, 11, 13\}$

$Q = \{8, 12\}$

$R = \{5, 6, 10, 15\}$

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Q22. $Q(x, y)$
 Grad PA \times Grad AB = -1
 $\frac{y-4}{x-5} \times \frac{-5-1}{7+2} = -1$
 $\frac{y-4}{x-5} \times \frac{-6}{9} = -1$
 $\frac{y-4}{x-5} = \frac{3}{2}$
 $2y - 8 = 3x - 15$
 Eqn PA: $2y = 3x - 7$
 $y = \frac{3}{2}x - \frac{7}{2}$ #

Q23.
 (a) $30 \text{ cm}^2 : 19.2 \text{ m}^2$
 $5.477 \text{ cm} : 4.3817 \text{ m}$
 $1 \text{ cm} : 0.800 \text{ m}$
 $\therefore n = 0.8$ #

(b) $1 \text{ L} = 16 \text{ m}^2$
 $500 \text{ mL} = 8 \text{ m}^2$
 $250 \text{ mL} = 4 \text{ m}^2$
 $2 \text{ sets of } 500 \text{ mL} = \42.50×2
 $= \$85$
 $1 \text{ set of } 250 \text{ mL} = \24
 $\therefore \$85 + \$24 = \$109$ #

Q24.
 (a)(i) $180 - 200 \text{ cm}$ #
 (ii) $[(110 \times 4) + (130 \times 5) + (150 \times 8) + (170 \times 11) + (190 \times 14) + (210 \times 12) + (230 \times 6)]$
 $\div (4 + 5 + 8 + 11 + 14 + 12 + 6)$
 $= 178 \frac{2}{3} \text{ cm}$
 $\approx 179 \text{ cm (3s.f.)}$ #

(b)(i) 24 #
 (ii) $204 - 156 = 48 \text{ cm}$

(c) Second set is more consistent than the first set because the second set has a lower interquartile range than the first set.

Q25.
 (a)(i) $p(2)^2 + q(2) = 8 + 11$
 $4p + 2q = 19$ (shown) #

(ii) $p + q = 8$ ①
 $4p + 2q = 19$ ②
 $\text{①} \times 2 : 2p + 2q = 16$ ③
 $\text{③} - \text{②} : -2p = -3$
 $p = 1.5$ ④ #
 Sub ④ into ① : $1.5 + q = 8$
 $q = 6.5$

(b) $[3(10)^2 + 7(10)] - [3(9)^2 + 7(9)]$
 $= 64$ #