

REG-CP1A-2425-ASM-SET 1-MATH**Suggested solutions****Conventional Questions**

1. (a) $25h^2 - 40hk + 16k^2 = (5h - 4k)^2$ 1A
(b) $49h^2k^2 - 25h^2 + 40hk - 16k^2$
 $= (7hk)^2 - (5h - 4k)^2$ 1M
 $= (7hk + 5h - 4k)(7hk - 5h + 4k)$ 1A
2. (a) $8a^2 + 24ab + 18b^2 = 2(2a + 3b)^2$ 1A
(b) $8a^2 + 24ab + 18b^2 - 32a - 48b$
 $= 2(2a + 3b)^2 - 16(2a + 3b)$ 1M
 $= 2(2a + 3b)(2a + 3b - 8)$ 1A
3. (a) $3\alpha^2 - 24\alpha + 48 = 3(\alpha - 4)^2$ 1A
(b) $3\alpha^2 - 8\alpha\beta - 24\alpha + 32\beta + 48$
 $= 3(\alpha - 4)^2 - 8\beta(\alpha - 4)$ 1M
 $= (\alpha - 4)[3(\alpha - 4) - 8\beta]$
 $= (\alpha - 4)(3\alpha - 8\beta - 12)$ 1A
4. (a) $9x^2 - 30xy + 25y^2 = (3x - 5y)^2$ 1A
(b) $9x^2 - 30xy + 25y^2 - 49(x - y)^2$
 $= (3x - 5y)^2 - 49(x - y)^2$ 1M
 $= [(3x - 5y) + 7(x - y)][(3x - 5y) - 7(x - y)]$
 $= (10x - 12y)(-4x + 2y)$ 1A
 $= 4(5x - 6y)(y - 2x)$ 1A
5. $3(x + 2) < \frac{3}{2}$
 $2x + 4 < 1$
 $x < -\frac{3}{2}$ 1A
 $5x + 1 \leq 3x + 2$
 $x \leq \frac{1}{2}$ 1A
Thus, we have $x < -\frac{3}{2}$. 1M

6. (a) $\frac{7x - 17}{3} < 5(x + 1)$
 $7x - 17 < 15x + 15$
 $x > -4$ 1A
 $5 - x < 6$
 $x > -1$ 1A
 Thus, we have $x > -4$. 1A
- (b) -3 1A
7. (a) $\frac{1}{3}(5x - 1) < \frac{x + 4}{2} + 2$
 $\frac{7x}{6} < \frac{13}{3}$
 $x < \frac{26}{7}$ 1A
 $21 \geq -7x$
 $x \geq -3$ 1A
 Thus, we have $-3 \leq x < \frac{26}{7}$. 1M
- (b) $1, 2, 3$ 1A
8. (a) $\frac{2x + 5}{3} \geq 3 - x$
 $\frac{5x}{3} \geq \frac{4}{3}$
 $x \geq \frac{4}{5}$ 1A
 $37 > 5 + 4x$
 $x < 8$ 1A
 Thus, $\frac{4}{5} \leq x < 8$. 1M
- (b) 1 1A
9. Let $\$x$ be the cost of the bag.
 Marked price = $x(1 + 50\%) = \$1.5x$ 1M
 Selling price = $1.5x(1 - 30\%) = \$1.05x$ 1M
 $1.05x - x = 70$ 1M
 $x = 1400$ 1A
 The cost of the bag is \$1400.
10. (a) Selling price = $950(1 - 20\%)$ 1M
 $= \$760$ 1A

$$(b) \text{ Cost} = \frac{760}{1 - 5\%} \quad 1M$$

$$= \$800 \quad 1A$$

11. Let $\$x$ be the marked price of textbook A .

$$\text{Marked price of textbook } B \text{ is } \$\frac{x}{1 - 24\%}. \quad 1M$$

$$\text{Selling price of textbook } A \text{ is } \$x(1 - 10\%). \quad 1M$$

$$\text{Selling price of textbook } B \text{ is } \$\frac{x(1 - 10\%)}{1 - 24\%}.$$

$$\frac{x(1 - 10\%)}{1 - 24\%} - x(1 - 10\%) = 64.8 \quad 1M$$

$$x = 228 \quad 1A$$

12. (a) Selling price = $2250(1 + 8\%)$ 1M

$$= \$2430 \quad 1A$$

(b) Marked price = $\frac{2430}{1 - 10\%}$ 1M

$$= \$2700 \quad 1A$$

13. (a) $\angle POQ = 110^\circ - 80^\circ = 30^\circ$ 1M

$$\angle OQP = 180^\circ - \angle POQ - \angle OPQ$$

$$= 180^\circ - 30^\circ - 60^\circ$$

$$= 90^\circ$$

$\triangle OPQ$ is a right-angled triangle. 1A

(b) $OP = 20$

$$\cos 30^\circ = \frac{OQ}{20} \quad 1M$$

$$\frac{\sqrt{3}}{2} = \frac{OQ}{20}$$

$$OQ = 10\sqrt{3}$$

$$\sin 30^\circ = \frac{PQ}{20}$$

$$PQ = 10$$

$$\text{Required area} = \frac{1}{2}(10\sqrt{3})(10) \quad 1M$$

$$= 50\sqrt{3} \quad 1A$$

14. (a) $A' (3, 300^\circ)$ 1A

$B' (4, 210^\circ)$ 1A

(b) $\angle A'OB' = 300^\circ - 210^\circ = 90^\circ$ 1A

- (c) Area of $\triangle AOB = \frac{1}{2}(3)(4 \sin 60^\circ)$
 $= 3\sqrt{3}$
 Area of $\triangle A'OB' = \frac{1}{2}(3)(4)$ 1M
 $= 6$
 $> 3\sqrt{3}$
 $\triangle A'OB'$ has a greater area. 1A
15. (a) $P' (2, -4)$ 1A
 $Q' (9, 3)$ 1A
- (b) Slope of $PQ = \frac{3+2}{1+4} = 1$ 1M
 Slope of $P'Q' = \frac{3+4}{9-2} = 1 = \text{slope of } PQ$
 PQ is parallel to $P'Q'$. 1
16. (a) $P' (7, 3)$ 1A
 $Q' (-3, 1)$ 1A
- (b) Required area = $\frac{(7-1)(7+3)}{2}$ 1M
 $= 30$ 1A
17. (a) 3460 1A
 (b) 3455.90 1A
 (c) 3400 1A
18. (a) 650 1A
 (b) 648.7 1A
 (c) 649 1A
19. Least total length of 30 long charging cable
 $= 30(247.5)$ 1M+1M
 $= 7425 \text{ cm}$
 $= 74.25 \text{ m}$
 $> 74.15 \text{ m}$
 The claim is incorrect. 1A

20. Least total volume of 60 *standard* cans of soda
- $= 60(447.5)$ 1M+1M
- $= 2685 \text{ mL}$
- $= 26.85 \text{ L}$
- $> 26.75 \text{ L}$
- The claim is incorrect. 1A
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21. Upper limit of the radius $= \frac{8.5}{2} = 4.25 \text{ cm}$ 1M
- Upper limit of the area
- $= \frac{1}{2} \times (4.25)^2 \pi$ 1M
- $\approx 28.4 \text{ cm}^2$ 1A
- $< 30 \text{ cm}^2$
- The claim is disagreed. 1A
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22. (a) Least possible height
- $= 1250 - 0.5$ 1M
- $= 1249.5 \text{ m}$ 1A
- (b) Relative error
- $= \frac{0.5}{1250}$
- $= 0.0004$ 1A