Mini Test Chap 1, 2 & 3

PERTH MODERN SCHOOL
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Semester One 2018
Mathematics Methods
Calc Assumed
(Formula sheet allowed)

Name: Solutions

Time: 25 minutes   **Total**:   /25 marks

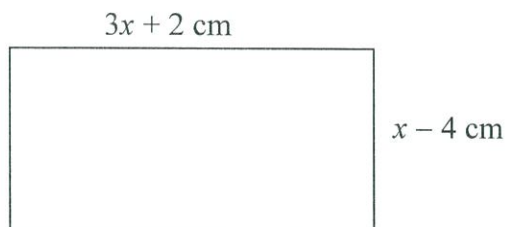**Working needs to be shown for full marks**

Question 1   [2 marks]

If $\frac{x}{6} - \frac{x-4}{2} = 0$, then what does x equal?

$\frac{x}{6} - \frac{x-4}{2}\left(\frac{3}{3}\right) = 0$

$\frac{x}{6} - \frac{3(x-4)}{6} = 0$

$x - 3x + 12 = 0.$

$-2x + 12 = 0$

$x = 6$

Question 2   [2 marks]

The perimeter of the rectangle shown is 60 cm.

$3x + 2$ cm

$x - 4$ cm

What is the value of x?

$P = 2L + 2W$

$60 = 2(3x+2) + 2(x-4)$

$60 = 6x + 4 + 2x - 8$

$\quad = 8x - 4$

$64 = 8x$

$x = 8$

Question 3   2 mark]

Solve the simultaneous equations:

$$8x + 3y = 14 \quad — ①$$
$$2x + y = 4 \quad — ②$$

② $\times -3$ $-6x - 3y = -12$ $—①$ ✓

① $+$ ② $2x = 2$

$x = 1$

Sub ② $2 + y = 4$

$y = 2$

$\therefore (1, 2)$ ✓

Question 4   [2 marks]

What is the equation of the line that passes through the point $(5, 9)$ and is parallel to the line $y = 3x + 7$.

$m = 3$

At $\overset{x \quad y}{(5, 9)}$

$y = mx + c$

$9 = 3(5) + c$ ✓

$c = -6$

$\therefore y = 3x - 6$. ✓

Question 5   [1 marks]

Point A has coordinates $(1, 10)$ and point B has coordinates $(5, 2)$. What are the coordinates of the midpoint of the line segment AB.

$$\text{Midpoint} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

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

$$= (3, 6) \quad ✓$$

Question 6   [2 marks]

What is the gradient of the line passing through the points with coordinates (2, 6) and (3, 11).

$$m = \frac{11-6}{3-2} \checkmark$$

$$= 5 \checkmark$$

Question 7   [3 marks]

What is the equation of the parabola that passes through the point (2, 11) and has its vertex at (−1, 4).

$$y = a(x+1)^2 + 4 \checkmark$$

At (2,11)

$$11 = a(2+1)^2 + 4$$

$$11 = 9a + 4$$

$$9a = 7 \checkmark$$

$$a = \frac{7}{9}$$

$$\therefore \quad y = \frac{7}{9}(x+1)^2 + 4 \checkmark$$

Question 8   [2 marks]

What is the maximum value of y for $y = 8 + 2x − x^2$.

Use Calculator

$$y = -x^2 + 2x + 8$$

$$= -(x^2 - 2x - 8)$$

$$= -(\;(x-1)^2 - 8 - 1\;)$$

$$= -(\;(x-1)^2 - 9\;)$$

$$= -(x-1)^2 + 9$$

$$\therefore \quad TP = (1, 9)$$

$$\therefore \quad \text{Max Value of } y \text{ is } 9 \checkmark$$

Question 9   [4 marks]

The graph of $y = 2x^2 - kx + 3$ touches the x-axis. What are the possible values of k.
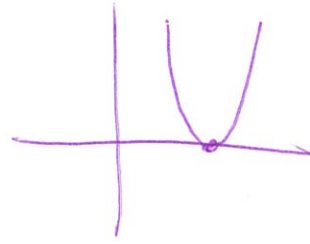
Discriminant $= 0$

$$0 = b^2 - 4ac$$
$$= (-k)^2 - 4(2)(3) \checkmark$$
$$= k^2 - 24 \checkmark$$
$$k^2 = 24$$
$$k = \pm\sqrt{24} = \pm\sqrt{4 \times 6} = \pm 2\sqrt{6}$$

Question 10   [1, 1, 1, 2 = 5 marks]

The height, h m, of a stone t seconds after it is thrown vertically upwards is given by $h = 41t - 5.5t^2$.

a   Find the maximum height reached by the stone.

$$\approx 76.4 \, m \quad \checkmark$$

b   What is the height of the stone when $t = 3$?

$$\approx 73.5 \quad \checkmark$$

c   Find the time it takes for the stone to return to the ground.

$$7.45 \text{ seconds} \quad \checkmark$$

d   Find the times at which the height of the stone is 60 m.

$$2 \text{ seconds} \quad \& \quad 5.45 \text{ seconds} \checkmark$$