SKH St. Simon's Lui Ming Choi Secondary School
Form 4 Mathematics   Tiered Assignment

Name:_____   **Class:**_____   **No.:**_____

Part A: Basic Questions (40 marks)

1. Solve the following quadratic equations. (Leave your answers in surd form if necessary.)

   (a) $3x^2 - x - 5 = 0$

<div align="right">(2 marks)</div>

   (b) $x(x+3) = 2x$

<div align="right">(2 marks)</div>

2. If the quadratic equation $x^2 + 4x + k = 0$ has two equal real roots, find the value of k.

<div align="right">(3 marks)</div>

3. It is given that $f(x) = \dfrac{3x}{x+2}$, where $x \ne -2$. Find the values of

   (a) $f(1)$,

<div align="right">(2 marks)</div>

   (b) $f\left(-\dfrac{3}{2}\right)$.

<div align="right">(2 marks)</div>

4. Let $f(x) = x^3 + 6x^2 - x - 30$.

(a) Show that $x - 2$ is a factor of $f(x)$.

(2 marks)

(b) Hence, factorize $f(x)$ completely.

(2 marks)

5. Simplify the following expressions.

(a) $\dfrac{x^2 - 1}{x + 2} \times \dfrac{3x + 6}{x + 1}$

(3 marks)

(b) $\dfrac{1}{x - 5} + \dfrac{1}{x^2 - 3x - 10}$

(3 marks)

6. Simplify the following expressions and express your answers with positive indices.

(a) $p^{-3} \times \sqrt[3]{-p}$

(2 marks)

(b) $\left(\dfrac{p^3}{q^6}\right)^{\frac{4}{3}} \times p^2$
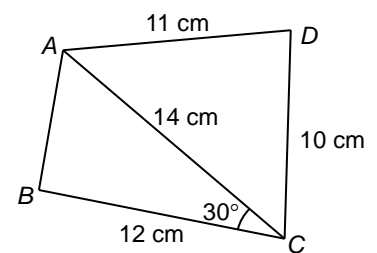
(2 marks)

7. Solve the simultaneous equations $\begin{cases} y = x^2 - 5x + 7 \\ x - 2y + 9 = 0 \end{cases}$.

(4 marks)

8. Given that $\cos x = -\dfrac{5}{\sqrt{74}}$ and $\sin x > 0$, find $\sin x$ and $\tan x$.

(4 marks)

9. In the figure, $AC = 14$ cm, $BC = 12$ cm, $CD = 10$ cm, $AD = 11$ cm and $\angle ACB = 30°$. Find the area of quadrilateral $ABCD$.
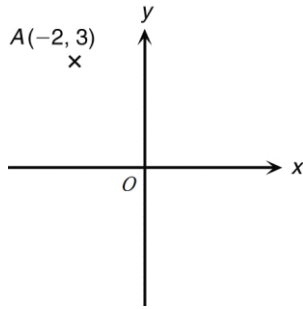

(4 marks)

10. Simplify $1 - \dfrac{\cos(90° - \theta)\cos(180° - \theta)}{\tan(360° - \theta)}$.

(3 marks)

4

Part B: Advanced Questions (16 marks)

11. In the figure, the coordinates of point *A* are (–2, 3). *A* is rotated clockwise about the origin *O* through 90° to *B*. *B* is then translated downwards by 5 units to *C*.

(a) Write down the coordinates of *B* and *C*.

(2 marks)

(b) Find the equation of *AC*.

(2 marks)

(c) *D* is a point on *AC* such that $AC \perp BD$.
   (i) Find the equation of *BD*.

(2 marks)

   (ii) Amy claimed that *BD* is the perpendicular bisector of *AC*. Do you agree? Explain your answer.

(2 marks)

12. Figure (1) shows a triangular cardboard *ABC*. *M* is a point on *AB* such that *CM* ⊥ *AB*. It is given that *AC* = 14 cm, *BC* = 22 cm and *AB* = 24 cm. *AM* : *MB* = 1 : 3.
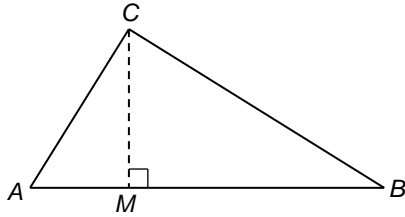

Figure (1)

(a) Find the length of *CM*.

(1 mark)

(b) The cardboard in Figure (1) is then folded along *CM* such that *AM* and *MB* lie on the horizontal ground as shown in Figure (2). It is given that ∠*AMB* in Figure (2) is 92°.
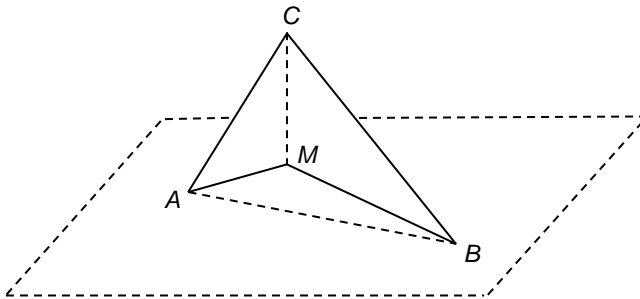

Figure (2)

(i) Find the length of *AB*.

(2 marks)

(ii) Find the shortest distance between *M* and *AB*.

(3 marks)

(iii) Find the angle between the planes *ABC* and *ABM*.

(2 marks)

~ End ~