



Name: _____

Date: _____

Score: _____ / 50

- 1 Solve the simultaneous equations

$$x^2 + y^2 = 20$$

$$y = 2x$$

(4 marks)

Answer _____

- 2 OAB is a triangle. $OA = \mathbf{a}$ and $OB = \mathbf{b}$.
M is the midpoint of OA and N is the midpoint of OB.
Show that MN is parallel to AB.

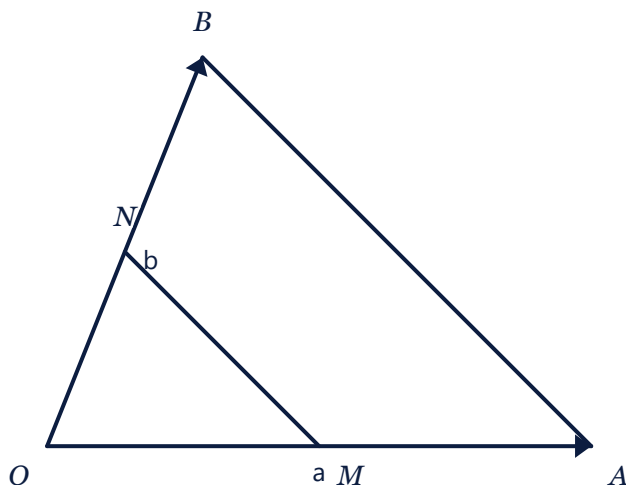


Diagram NOT accurately drawn

(3 marks)

Answer _____

- 3 The curve **C** has equation $y = \cos x^\circ$ for $0 \leq x \leq 360$.
Write down the coordinates of the minimum point of **C**.

(2 marks)

Answer _____

- 4 OAB is a triangle.
Vector $OA = \mathbf{a}$ and vector $OB = \mathbf{b}$.
M is the midpoint of OA and N is the midpoint of OB.
Prove that MN is parallel to AB.

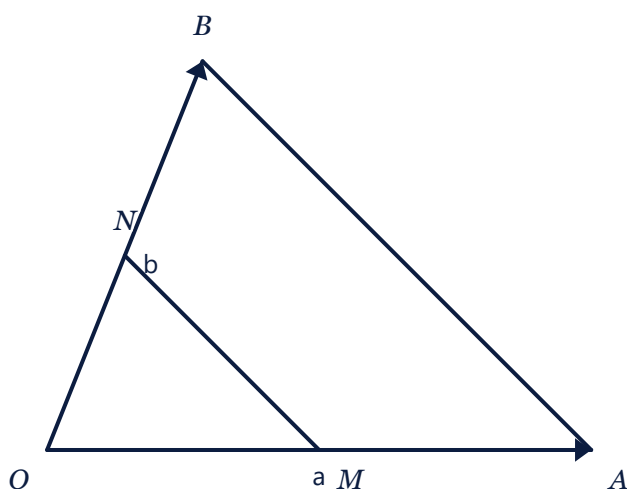


Diagram NOT accurately drawn

(4 marks)

Answer _____

- 5 Expand and simplify $(5 + 2\sqrt{3})(5 - 2\sqrt{3})$

(2 marks)

Answer _____

- 6 The graph of $y = \sin x$ for $0^\circ \leq x \leq 360^\circ$ has a maximum point at $(90, 1)$.
a. Write down the coordinates of the maximum point of the graph of $y = \sin x - 3$
b. Write down the coordinates of the maximum point of the graph of $y = \sin(x - 30^\circ)$

(2 marks)

Answer _____

7 Solve $(x - 3)(x + 7) \geq 0$

(2 marks)

Answer _____

8 The number of members of a gym is modelled by the rule

$$u_{n+1} = 1.2u_n - 50$$

where u_n is the number of members after n years.

There are 500 members now, so $u_0 = 500$.

Work out the number of members the model predicts after 2 years.

(2 marks)

Answer _____

9 A runner's velocity-time graph is a smooth curve. The table gives her velocity v m/s at time t seconds.

t : 0, 10, 20, 30 v : 0, 4.2, 6.6, 7.8

Use the trapezium rule with 3 strips of equal width to estimate the distance the runner travels in the first 30 seconds.

(3 marks)

Answer _____

- 10** ABCDEFGH is a cuboid with base ABCD and top face EFGH, where E is directly above A, F is directly above B, G is directly above C and H is directly above D.
 AB = 3 cm, BC = 4 cm and CG = 12 cm.
 Work out the length of AG.

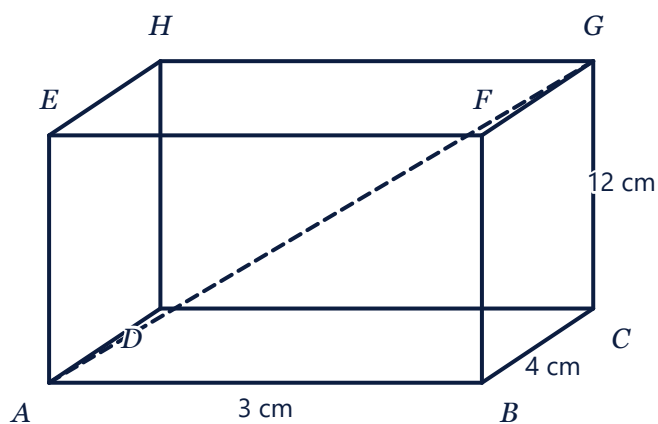


Diagram NOT accurately drawn

(2 marks)

Answer _____

- 11** A circle has its centre at the origin O. The diameter of the circle is 16.
 Find the equation of the circle.

(2 marks)

Answer _____

12 $f(x) = x^3 - 4x - 3$

Show that the equation $f(x) = 0$ has a root between $x = 2$ and $x = 3$.

(2 marks)

Answer _____

- 13** Write $\frac{x+1}{2} + \frac{2x-1}{5}$ as a single fraction in its simplest form.

(2 marks)

Answer _____

14 The temperature, T °C, of a cup of tea is plotted against time, t minutes, and the points form a smooth curve going down.

At $t = 10$ a tangent is drawn to the curve. The tangent passes through the points (2, 80) and (14, 56).

a. Work out the gradient of the tangent.

b. What does this gradient tell you about the tea at $t = 10$?

(3 marks)

Answer _____

15 The curve **C** has equation $y = x^2 - 4x + 7$

The line **L** has equation $y = 2x - 2$

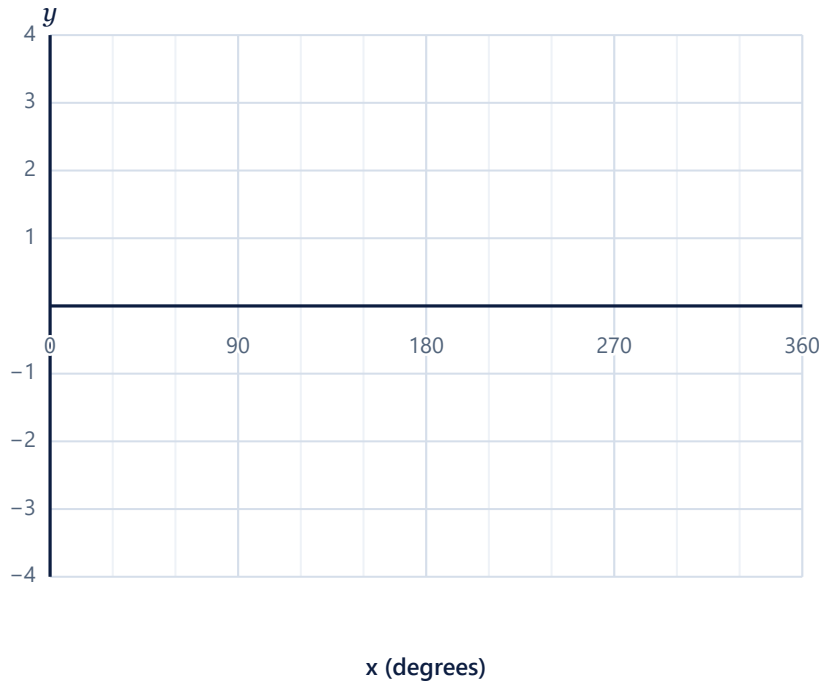
Show that **L** touches **C** at exactly one point, and find the coordinates of this point.

(4 marks)

Answer _____

- 16 Sketch the graph of $y = \tan x^\circ$ for $0 \leq x \leq 360$.

Show clearly where the graph crosses the x -axis and mark the values of x where the graph has asymptotes.



(2 marks)

Answer _____

- 17 The graph of $y = f(x)$ has a turning point at $(3, -5)$.

- Write down the coordinates of the turning point of the graph of $y = f(x) + 4$
- Write down the coordinates of the turning point of the graph of $y = f(x - 2)$

(2 marks)

Answer _____

- 18 The circle C has equation $x^2 + y^2 = 61$

- Show that the point A $(5, -6)$ lies on C.
- Does the point B $(4, 7)$ lie on C? You must justify your answer.

(3 marks)

Answer _____

19 Erin is asked to rationalise the denominator of $\frac{8}{\sqrt{6}}$

Here is her working.

$$\frac{8}{\sqrt{6}} = \frac{8 \times \sqrt{6}}{\sqrt{6} \times \sqrt{6}} = \frac{8\sqrt{6}}{36}$$

Erin has made one mistake.

Explain the mistake Erin has made.

(2 marks)

Answer _____

20 Rationalise the denominator of $\frac{12}{\sqrt{3}}$

Give your answer in its simplest form.

(2 marks)

Answer _____

End of questions | Total 50 marks