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ANSWER IN THE SPACES PROVIDED
Answer all questions in the spaces provided.

1 (a) \[
\frac{y^6 \times y}{y^m} = y^4
\]
Circle the value of \(m\). [1 mark]

\[ -2 \quad 1.5 \quad 2 \quad 3 \]

1 (b) \[a^n \times a^5 = a^5\]
Work out the value of \(n\). [1 mark]

Answer

1 (c) \[(c^5)^p = (c^2)^6\]
Work out the value of \(p\). [2 marks]

Answer
2. Solve \( \sqrt[3]{7x - 13} = 2 \)  

\[ x = \frac{2^3 + 13}{7} = \frac{27}{7} \]

3. \[ 3a(2x - 1) + 4(ax + 5) \equiv 60x + b \]

Work out the values of \( a \) and \( b \).  

\[ a = \frac{60 - 4}{2} = 28 \]

\[ b = 4 \times 5 = 20 \]
4  \( ABC \) is a straight line with \( AB : BC = 5 : 2 \)

Work out the coordinates of \( C \).

[4 marks]

Answer \((\phantom{0000} , \phantom{0000})\)
5 \[ y = 2x^{10} - \frac{3}{x^2} \]

Work out \( \frac{dy}{dx} \) \[ \text{[3 marks]} \]

Answer

6 Simplify fully \( \frac{15x^2y - 5xy^2}{12x - 4y} \) \[ \text{[3 marks]} \]

Answer
7. \(ABCD\) is a rhombus with side length 8 cm
Angle \(ABC = 60^\circ\)

Work out the area of the rhombus.
Give your answer in the form \(a\sqrt{b}\) cm\(^2\) where \(a\) and \(b\) are integers.

Answer \(_________________________\) cm\(^2\)
The curve \( y = 2x^3 - 3x^2 - 12x + 6 \)

has a maximum point at \( L (-1, 13) \)

has a minimum point at \( M (2, -14) \)

intersects the \( y \)-axis at \( N \).

The curve crosses the \( x \)-axis at three distinct points.

On the axes below, sketch the curve.

Label the points \( L, M \) and \( N \) on your sketch.
A, B, C and D are points on a circle.

\[ \angle BCA = x \quad \angle ACD = 2x \quad \angle CAD = 3x \quad \angle CAB = 4x \]

Prove that AC is a diameter.

[4 marks]
10

\[ f(x) = \left( \frac{9x}{2} \right)^{-1} \]

\[ g(x) = \sqrt{1 - px^3} \text{ where } p \text{ is a constant.} \]

Given that \( f\left( \frac{1}{3} \right) = g\left( \frac{1}{3} \right) \) work out the value of \( p \).

[5 marks]

Answer ____________________________________
11 A circle, centre C, touches the y-axis at the point (0, 2)

The line \( y = k \) intersects the circle at the points (1, \( k \)) and (5, \( k \))

Work out the equation of the circle.

[3 marks]

Answer: ________________________________
Work out the length of $BC$.  

$$AB = 4 \text{ cm} \quad AC = 7 \text{ cm} \quad \cos x = \frac{2}{7}$$

Answer __________________________________________ cm

Rearrange $t = \frac{3w^3 + a}{w^3 - 2}$ to make $w$ the subject.

Answer __________________________________________
14 Rationalise and simplify \( \frac{\sqrt{3} - 7}{\sqrt{3} + 1} \)

Give your answer in the form \( a + b\sqrt{3} \) where \( a \) and \( b \) are integers.

[4 marks]
15  Point A lies on the curve  \( y = x^2 + 5x + 8 \)

The x-coordinate of A is – 4

15 (a) Show that the equation of the normal to the curve at A is  \( 3y = x + 16 \)  

[5 marks]
15 (b) The normal at $A$ also intersects the curve at $B$.

Work out the $x$-coordinate of $B$.  

Answer ________________________________
16 The coefficient of the $x^4$ term in the expansion of $(2x + a)^6$ is 60

Work out the possible values of $a$. [4 marks]

Answer ________________________________
Solve the simultaneous equations

\[ 2a + b - c = 8 \]
\[ 4a - 3b - 2c = -9 \]
\[ 6a + 3b + c = 0 \]

[5 marks]

\[ a = \quad b = \quad c = \]
18  Solve \( \frac{2}{x} - \frac{1}{3} = 12 \frac{1}{4} \)

[3 marks]

\[ x = \underline{\text{ }} \]

19  \( f(x) = 2x^3 - 12x^2 + 25x - 11 \)

Use differentiation to show that \( f(x) \) is an increasing function for all values of \( x \).

[4 marks]
20 (a) Show that \(2\cos^2 \theta = 2 - 2\sin^2 \theta\) \[1\text{ mark}\]

20 (b) Hence, solve \(2\cos^2 \theta + 3\sin \theta = 3\) for \(0 < \theta < 180^\circ\) \[4\text{ marks}\]

Answer ___________________________________________________________________

END OF QUESTIONS