

1. Simplify $(3x^3)^2 - (3x - 4)^2$. [2]

2. Express $x^2 + 4x - 8$ in the form $(x + h)^2 + k$. [2]

3. Solve $3x^2 + 19x + 9 > 3$. [2]

4. Solve

$$\frac{8x^2 - 13x}{x - 2} - (5x + 3) = -5.$$

[3]

5. Long divide $\frac{x^2 + 3x - 4}{x + 8}$. [2]

6. (a) Make x the subject from the following equation:

$$\ln(5 - x) = -7t.$$

[1]

(b) What can you say about x for large values of t ? [1]

7. (a) Make y the subject from the following equation:

$$\ln\left(\frac{2 + y}{2 - y}\right) = 5t.$$

[3]

(b) *** What can you say about y for large values of t ? [1]

8. Evaluate the following, leaving your answer in exact form.

(a) $\sin \frac{\pi}{6}$, [1]

(b) $\cos \frac{\pi}{6}$, [1]

(c) $\tan \frac{\pi}{6}$, [1]

(d) $\sin \frac{\pi}{4}$, [1]

(e) $\cos \frac{3\pi}{4}$. [1]

9. Solve, for $0 \leq \theta \leq \frac{\pi}{2}$,

$$\cos 2\theta + 5 \sin \theta - 3 = 0.$$

[3]

10. Find the values of the constants a and b such that

$$-\sec^2 \theta - 9 = a \tan^2 \theta + b$$

for all values of θ . [3]

Answers

1. $9x^6 - 9x^2 + 24x - 16$.
2. $(x + 2)^2 - 12$.
3. $x < -6$ or $x > -\frac{1}{3}$.
4. $x = -1$ or $x = \frac{4}{3}$.
5. $x = x - 5 + \frac{36}{x + 8}$.
6. (a) $x = 5 - e^{-7t}$.
(b) $x \rightarrow 5$.
7. (a) $x = \frac{2e^{5t} - 2}{e^{5t} + 1}$.
(b) $y \rightarrow 2$.
8. (a) $\frac{1}{2}$.
(b) $\frac{1}{2}\sqrt{3}$.
(c) $\frac{1}{3}\sqrt{3}$.
(d) $\frac{1}{2}\sqrt{2}$.
(e) $-\frac{1}{2}\sqrt{2}$.
9. $\theta = \frac{1}{6}\pi$.
10. $a = -1, b = -10$.