

# Pre-Entry Test for MATH101: Solutions

Each completely correct question is worth one mark. If a question has two parts, each correct part is worth half a mark. The test is out of a total of 16 marks, and we would expect students enrolling in MATH101 to get **at least** 75% or 12/16 correct.

1. Solve the following problems. Answers:

(a)  $3 - 5 \times 2 = -7$

(b)  $6 + 2 \div 4 = \frac{13}{2}$

2. Convert the following decimals and percentages into fractions. Answers:

(a)  $0.405 = \frac{405}{1000} = \frac{81}{200}$

(b)  $0.1\% = \frac{1}{1000}$

3. (a) What is 5% of 1,000? Answer: 50

(b) If the original retail price of an item is \$160.00, what is the price of the item when it is reduced by 25% in a sale? Answer: \$120.

4. Evaluate and express as a single fraction in lowest terms (that is, give your answer in the form  $\frac{p}{q}$  where  $p$  and  $q$  have no common factor). Answers:

(a)  $\frac{1}{3} + \frac{5}{6} = \frac{7}{6}$

(d)  $\frac{2}{3} \div \frac{3}{4} = \frac{2}{3} \times \frac{4}{3} = \frac{8}{9}$

5. A group of three investors buy some shares together. John puts in \$2000, Steve puts in \$3000, and Joanne puts in \$4000. A year later they receive their first dividend of \$360. How should they share out this amount?

Answer: John receives \$80, Steve receives \$120, and Joanne receives \$160.

6. Expand and simplify the expression  $(2x - 3y)^2$ . Answer:  $4x^2 - 12xy + 9y^2$ .

7. Given that  $x = 1$ ,  $y = 5$ , and  $z = 9$ , evaluate the following expressions.

(a)  $4(x + y)^2$  Answer: 144.

(b)  $-5xy + \sqrt{z}$  Answer: -22.

8. Solve the equation  $0.04x = 20$ .      Answer:  $x = 500$ .

9. Solve the quadratic equation  $x(x - 3) = 0$ .      Answer:  $x = 0, 3$

10. Solve this pair of simultaneous equations.      Answer:  $x = 5, y = 3$ .

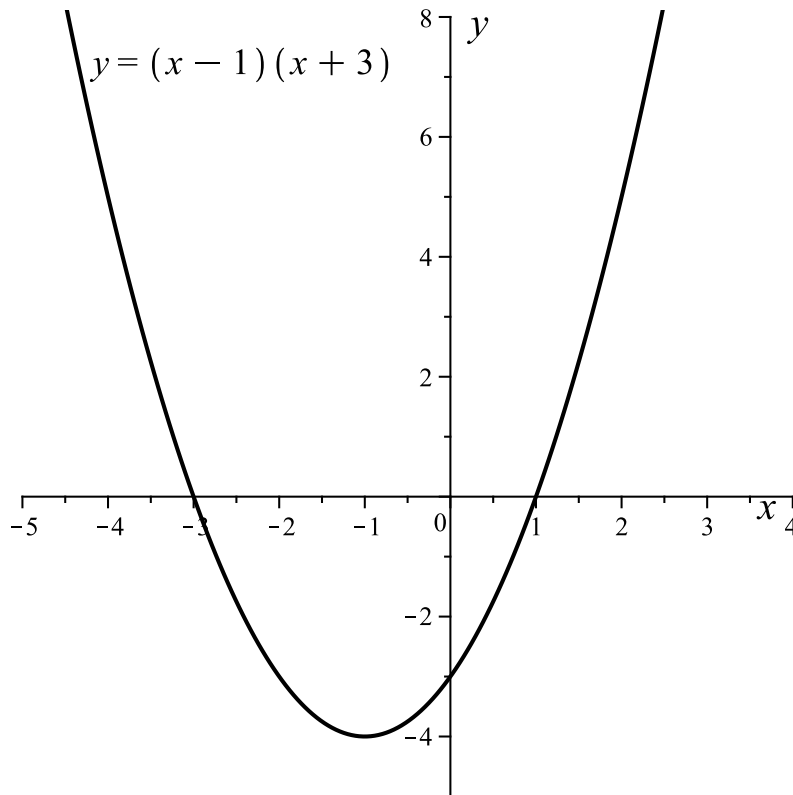
$$\begin{aligned}x + y &= 8 \\2x - y &= 7\end{aligned}$$

11. Give the equation of the line through the points  $(1, 1)$  and  $(-1, 2)$ .

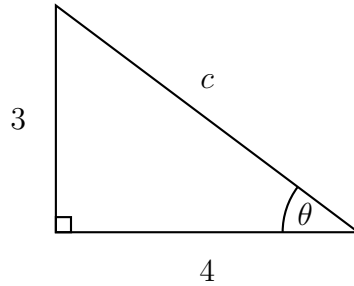
Answer:  $y = -\frac{1}{2}x + \frac{3}{2}$ .

12. Plot the graph of  $y = (x - 1)(x + 3)$ .

**Note:** To get the mark for this question, you should have labelled the  $x$ - and  $y$ - axes and given a suitable scale on each axis.



13. Consider the following triangle.

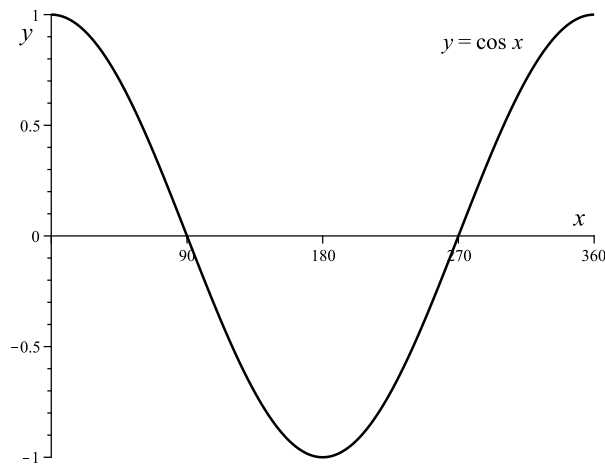


(a) Find the length of side  $c$ .      Answer:  $c = 5$ .

(b) Find  $\tan \theta$ .      Answer:  $\tan \theta = \frac{3}{4}$ .

14. Plot the graph of  $y = \cos(x)$  from  $x = 0^\circ$  to  $x = 360^\circ$ .

Note that the graph should have labels on the  $x$ - and  $y$ - axes, a suitable scale on both axes, and have the correct amplitude and period.



15. A function is given by  $f(x) = x^2 - 3x + 6$ . Find the gradient of this function at the point where  $x = -1$ .      Answer:  $-5$ .

16. (a) Evaluate  $\int (3x^2 + 1) dx$ .      Answer:  $x^3 + x + C$

(b) Use the result from (a) to find  $\int_0^2 (3x^2 + 1) dx$ .      Answer: 10.