

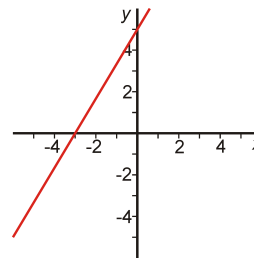
Practice Math Placement Exam

The following are problems like those on the Mansfield University Math Placement Exam. You must pass this test or take MA 0090 before taking any mathematics courses.

1. What is the product of -4 and -8 ?
2. What is $28 \div (-7)$?
3. What is $\frac{17}{15} - \frac{8}{15}$?
4. What is $\frac{5}{7} \div \frac{6}{11}$?
5. Simplify $\frac{19 - (-2)(-5)}{3}$.
6. What is $\frac{7}{10} + \frac{4}{15}$?
7. Round 177.546811 to three decimal places (that is, round to three digits to the right of the decimal point.)
8. Convert 0.3547 to a fraction.
9. Evaluate the expression $x^2 - 5x + 3$ for $x = -1$.
10. Write the following without parentheses $-3(x^2 - 3x + 4)$.
11. Multiply out $(x - 3)(x + 5)$.
12. Multiply out $(x - 5)^2$.
13. Simplify $x^4 \cdot x^3$.
14. Simplify $(x^3)^5$.
15. Simplify $\frac{x^9}{x^4}$.
16. Simplify $(-1)^4$.
17. Solve the equation $3x + 4 = 10$.
18. What is 50% of 70?
19. Of $x = -2$, $x = -1$, $x = 0$, $x = 1$, and $x = 3$, which are solutions to the inequality $3x^2 \geq 12$?
20. Simplify $|7 - 11|$.
21. Graph the equation $-2x + 5y = 10$.

22. Graph the equation $y = \frac{2}{5}x + 2$.

23. What is the slope of the line pictured?



24. A distance of 1 inch represents 15 miles. If two points on the ground are 45 miles apart, how far are they apart on the map?
25. Substitute $m = -4$, $n = -2$, and $s = 3$ into the following expression and simplify.

$$\frac{s + \frac{m+n}{m-n}}{\frac{m}{m-n}}$$

Answers:

1. What is the product of -4 and -8 ?

Answer: 32 Remember that the product of two negative numbers is positive, and the product of a negative and a positive is negative.

2. What is $28 \div (-7)$?

Answer: -4 The properties for dividing positive and negative numbers is the same as for multiplication.

3. What is $\frac{17}{15} - \frac{8}{15}$?

Answer: $\frac{9}{15} = \frac{3}{5}$ Adding and subtracting fractions with the same denominator is easy. Here, we have 17 fifteenths and we're subtracting 8 fifteenths, which leaves 9 fifteenths. The Math Placement Exam is a multiple choice test, and the correct answer may not be in reduced form.

4. What is $\frac{5}{7} \div \frac{6}{11}$?

Answer: $\frac{55}{42}$ Multiplying and dividing fractions is also easy. To multiply, you multiply the numerators and you multiply the denominators. In this case, we are dividing by $\frac{6}{11}$, which is equivalent to multiplying by $\frac{11}{6}$. In other words, we *invert and multiply*.

$$\frac{5}{7} \div \frac{6}{11} = \frac{5}{7} \cdot \frac{11}{6} = \frac{5 \cdot 11}{7 \cdot 6} = \frac{55}{42}$$

5. Simplify $\frac{19 - (-2)(-5)}{3}$.

Answer: 3 Remember to use the standard order of operations (grouping symbols, then exponents and radicals, then multiplication/division, and finally addition and multiplication). In this case, the division bar tells us to compute the numerator and denominator before dividing. In the numerator, we do the multiplication first, to get $19 - 10$, which simplifies to 9. Finally, 9 divided by 3 equals 3.

6. What is $\frac{7}{10} + \frac{4}{15}$?

Answer: $\frac{29}{30}$ To add these fractions, we must first convert both fractions so that they have the same denominator, which in this case can be 30. This gives us $\frac{21}{30} + \frac{8}{30}$. This is now similar to problem 3, and we get $\frac{29}{30}$.

7. Round 177.546811 to three decimal places (that is, round to three digits to the right of the decimal point.)

Answer: 177.547 To round correctly, we look at the next digit. If the next digit is 5 or more, we round up. Otherwise, we round down. In this case, the next digit is 8, so we round the 6 up to 7.

8. Convert 0.3547 to a fraction.

Answer: $\frac{3547}{10000}$ Remember that the digits to the right of the decimal point represent tenths, hundredths, thousandths, etc. In this case, the fourth digit represents ten-thousandths, and we have 3,547 of these ten-thousandths.

9. Evaluate the expression $x^2 - 5x + 3$ for $x = -1$.

Answer: 9 It's a good idea to always substitute into parentheses. Here, we get $(-1)^2 - 5(-1) + 3 = 1 + 5 + 3 = 9$.

10. Write the following without parentheses $-3(x^2 - 3x + 4)$.

Answer: $-3x^2 + 9x - 12$ We're distributing here, and the -3 must be multiplied times every term inside the parentheses.

11. Multiply out $(x - 3)(x + 5)$.

Answer: $x^2 + 2x - 15$ Some would call this FOIL-ing. In general, when multiplying polynomials by polynomials, we multiply every term in the first factor times every term in the second. Here, we get $x \cdot x + x \cdot 5 + (-3) \cdot x + (-3) \cdot 5 = x^2 + 5x - 3x - 15 = x^2 + 2x - 15$.

12. Multiply out $(x - 5)^2$.

Answer: $x^2 - 10x + 25$ The result of this is a perfect square trinomial, which we know will take a special form. Alternatively, we can simply multiply $(x - 5)(x - 5)$ as we did in problem 11.

13. Simplify $x^4 \cdot x^3$.

Answer: x^7 Here, we have 4 factors of x times 3 factors of x , which is 7 factors altogether. Symbolically, when we multiply exponential expressions with the same bases, we add the exponents.

14. Simplify $(x^3)^5$.

Answer: x^{15} Here, we have 3 factors of x multiplied 5 times, which is 15 factors altogether. Symbolically, when we raise an exponential expression to another exponent, we multiply exponents.

15. Simplify $\frac{x^9}{x^4}$.

Answer: x^5 Here, we have 9 factors of x , and we are dividing by 4 factors of x . This leaves 5 factors. Symbolically, when we divide exponential expressions with the same bases, we subtract exponents.

16. Simplify $(-1)^4$.

Answer: 1 Remember that when multiplying an even number of negative numbers together, the result is positive. If there are an odd number of negatives, the result is negative.

17. Solve the equation $3x + 4 = 10$.

Answer: $x = 2$ When solving linear equations, we do the same thing to both sides to try to get x by itself on one side. In this case, we can subtract 4 from both sides to get $3x = 6$. Then we divide both sides by 3 to get $x = 2$. At this point it is obvious that x must be 2.

18. What is 50% of 70?

Answer: 35 A percent, like 50% can be thought of as a fraction, $50/100 = 0.50$. To find “a percentage of ...,” we multiply. In this case, we have $0.50 \cdot 70 = 35$. On the Placement Exam, you’ll need to be able to do this without a calculator.

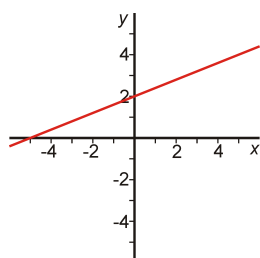
19. Of $x = -2$, $x = -1$, $x = 0$, $x = 1$, and $x = 3$, which are solutions to the inequality $3x^2 \geq 12$?

Answer: $x = -2, 3$ There are infinitely many solutions to this inequality, but this question is only asking which of these numbers are solutions. Plugging $x = -2$ into the left side, we get $3(-2)^2 = 12$, which is equal to, and therefore greater than or equal to, 12, so $x = -2$ is a solution. For $x = -1$, the left side is $3(-1)^2 = 3$, which is not greater than or equal to 12, so $x = -1$ is not a solution. Similarly, you will find that $x = 0$ and $x = 1$ are not solutions, and $x = 3$ is a solution.

20. Simplify $|7 - 11|$.

Answer: 4 You can think of an absolute value as being a distance from zero, and as a result must be zero or positive. In this case, we have $|7 - 11| = |-4| = 4$.

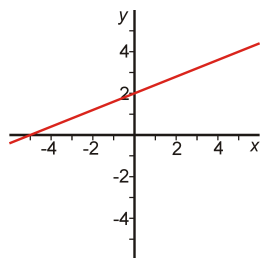
21. Graph the equation $-2x + 5y = 10$.



Answer: a.

To graph a line, you need to find at least two points on the line (i.e., two solutions to the equation). Two easy points take the form $(0, y)$ and $(x, 0)$. For $(0, y)$, if we substitute into the equation, we get $-2(0) + 5y = 10$, which becomes $5y = 10$ and $y = 2$. The point $(0, 2)$, therefore, is a point on the line. Similarly, you can find that $(-5, 0)$ is also a point on the line. Plotting these two points and drawing a straight line through them, gives you the graph shown above.

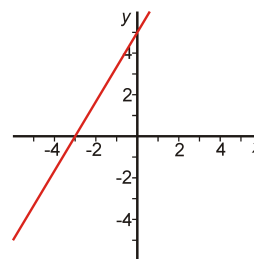
22. Graph the equation $y = \frac{2}{5}x + 2$.



Answer: a.

This equation can be graphed as in problem 21, but this equation is in “slope-intercept” form, $y = mx + b$. In this case, we know that b is the y -intercept, so $(0, b) = (0, 2)$ is a point on the line. Since the slope is $m = \frac{2}{5}$, we can count from the y -intercept “up 2, right 5” to find another point, $(5, 4)$. Drawing the line through these points gives you the graph. The line is the same as the one from problem 21, but on the Placement Exam, this won’t be the case.

23. What is the slope of the line pictured?



Answer: $m = \frac{5}{3}$ The slope is the change in y over the change in x between any pair of points on the line. Looking at the graph, the easiest point to see are $(0, 5)$ and $(-3, 0)$. The change in y is $0 - 5 = -5$, and the change in x is $-3 - 0 = -3$. The slope, therefore, is $m = \frac{-5}{-3} = \frac{5}{3}$.

24. A distance of 1 inch represents 15 miles. If two points on the ground are 45 miles apart, how far are they apart on the map?

Answer: 3 inches Let’s say the distance we’re looking for is x inches. The distances on the map are proportional to the actual distances so x is to 45 as 1 is to 15. In other words, $\frac{x}{45} = \frac{1}{15}$. Solving this equation yields $x = 3$.

25. Substitute $m = -4$, $n = -2$, and $s = 3$ into the expression

$$\frac{s + \frac{m+n}{m-n}}{\frac{m}{m-n}}$$

Answer: 3 Here, we simply substitute the values into the expression and simplify. Be sure to follow the order of operations.

$$\frac{s + \frac{m+n}{m-n}}{\frac{m}{m-n}} = \frac{(3) + \frac{(-4)+(-2)}{(-4)-(-2)}}{\frac{(-4)}{(-4)-(-2)}} = \frac{(3) + \frac{-6}{-2}}{\frac{(-4)}{-2}} = \frac{3 + 3}{2} = \frac{6}{2} = 3$$