

Placement Review Prep Questions

MTH 093 – Pre-Algebra

Whole Numbers and Number Sense

1. Round 5,743 to the nearest hundred.

2. Janice had \$3,928 in her checking account. After she wrote checks for \$416, \$56, \$107, and \$784, how much did she have left in her account?

3. Margaret wants to put new tile in her bathroom. How much tile will she need to cover the floor which is 6 feet by 9 feet?

Factors and the Order of Operations

4. Simplify $18 - 15 \div 3 + 6(7 + 2)$

5. Prime factor 600

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Fractions: Multiplication and Division

6. $6\frac{2}{5} \times 4\frac{3}{8}$

7. $\frac{7}{9} \div \frac{1}{3}$

8. $\frac{7}{9} \div 4\frac{5}{11}$

Fractions: Addition and Subtraction

9. $7\frac{1}{4} - 3\frac{3}{4}$

10. ABC stock was at $56\frac{1}{2}$ but went up $\frac{7}{8}$. What is the new value?

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$$11.9\frac{5}{8} + 13\frac{5}{8}$$

Decimals

12. Marco bought 3.5 pounds of candy at \$0.79 per pound. How much did he pay?

13. Convert $\frac{5}{8}$ to a decimal.

14. Multiply $(9.84)(0.02)$

Ratios, Proportions, and Percents

15. Convert .07 to a percent.

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16. 60 is 30% of what?

17. Jerome bought a computer which was ticket priced at \$2,500 but discounted 60%. Find the amount of discount and the sale price.

18. 19 is 25% of what?

19. Rita bought a fax machine which was ticket priced at \$540 but discounted 40%. Find the sale price.

Integers and Algebraic Expressions

20. $-15 + 2 - 11$

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21. Evaluate $-10x + 3y$ for $x = -7$, $y = -9$

22. Simplify $5(11^2 - 4 \cdot 18 + 2)$

23. Simplify $8(3x + 6) + 4(7x + 5)$

24. $(-4)^2 \cdot (-5)$

25. Brian's stock lost \$7 on Monday, gained \$2 on Tuesday, gained another \$11 on Wednesday, but lost \$9 Thursday and \$12 Friday. What was the total loss or gain?

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Equations

$$26. 3x = -24$$

$$27. 9x - 7 = 65$$

$$28. 6x - 7 = 41$$

$$29. 5(x - 4) = 3x - 88$$

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Additional Topics for Review

Ratios, Proportions, and Percents

1. Write 6 ounces to 3 pounds as a fraction in lowest terms.

2. Solve for x: $\frac{11}{20} = \frac{x}{60}$

3. Express as a ratio: 9 yards to 17 feet

4. Solve this proportion $\frac{12}{x} = \frac{5}{6}$

Polynomials

5. Subtract $(11x^2 - 4x + 13) - (3x^2 + 6x - 5)$

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6. Multiply $(x + 9)(x - 3)$

7. Simplify $\frac{12xy^5}{36x^9y^3}$

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MTH 095/097 – Elementary Algebra

Review of Real Numbers

1. Simplify: $\frac{27-9\div 3+4}{2(8-3)^2-22}$

2. Evaluate: $11 - 6x + 8y$ for $x = 2$, $y = 10$

Equations, Inequalities, and Problem Solving

3. Simplify: $2(3x + 11) - 9(x + 6)$

4. 35 more than the cost of 7 concert tickets

5. Solve $9x - 5 = -77$

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6. Solve $4(x + 12) = 5(x - 9) - 29$

7. $.08x - .04 = .1x$

8. The length of a warehouse basement is 5 meters less than 4 times the width. The perimeter is 390 meters. Find the length and width.

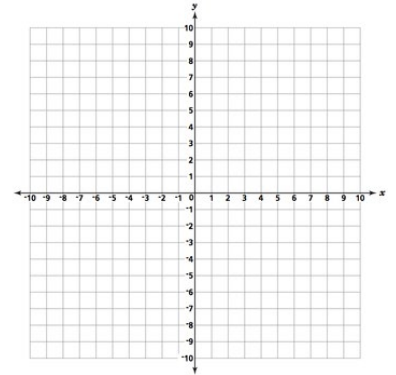
9. Juanita found a tent with a discount price of \$150. If the discount was 25%, what was the original price?

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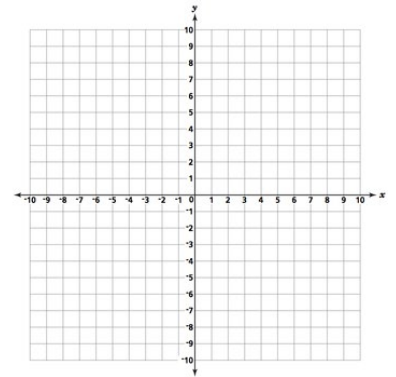
Graphing

10. Graph by solving for y and creating a T-table

i. $4x + 2y = 10$

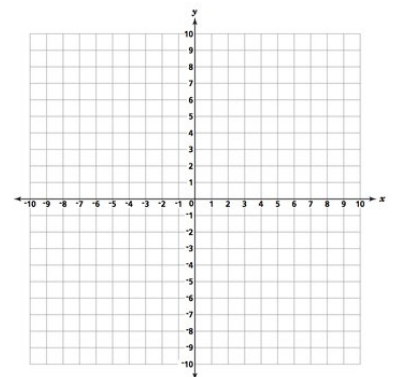


ii. $y = \frac{2}{3}x - 1$

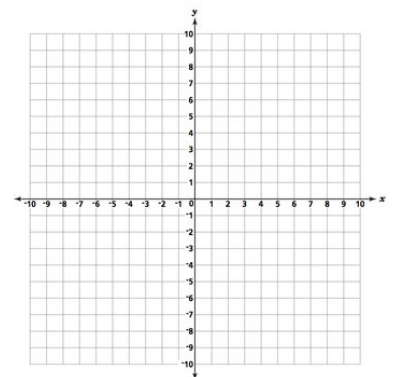


11. Graph by using the x and y-intercepts

i. $4y - 6x = 12$



ii. $x = -3$



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12. Find $g(4)$ given $g(x) = -7x + 15$

Solving Systems of Linear Equations

13. Solve the system:
$$\begin{cases} x - y + z = 9 \\ 2y + 3z = 12 \\ z = 4 \end{cases}$$

14. Solve the system:
$$\begin{cases} 5x - 2y = 11 \\ 3x + 5y = 19 \end{cases}$$

15. Emilio goes to a bank and gets change for a \$100 bill. He gets \$10 and \$5 bills. There are 16 bills in all. How many of each kind are there?

Exponents and Polynomials

16. Simplify. Do not use negative exponents

i. $(11x^2 - 3x + 14) - (4x^2 + 7x + 8)$

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ii. $\frac{3x^5y^4z^7}{12x^9y^4z^2}$

iii. $2x(7x^2 + 4x - 15)$

iv. $(3x - 5)(7x + 11)$

v. $(4 \times 10^{-8})(6 \times 10^3)$ Give your answer in scientific notation.

Factoring Polynomials

17. Factor completely

i. $12x^3 - 36x^2 - 120x$

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ii. $4x^2 - 88x + 484$

iii. $ax^2 - 9z + 8x^2 - 72$

iv. Solve: $x^3 - 4x^2 - 45x = 0$

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MTH 100 – Intermediate Algebra

Rational Expressions

1. Simplify and state the restrictions on the domain.

i. $\frac{9x^2-36}{16x-32}$

ii. $\frac{5x}{x+4} + \frac{2}{3}$

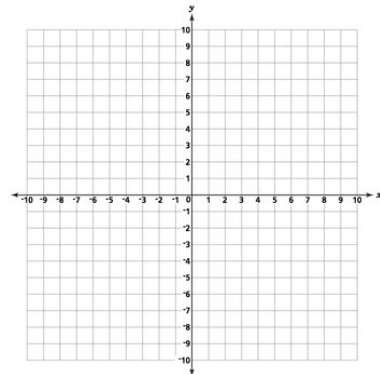
2. Solve: $\frac{x}{5} = \frac{14}{x-3}$

More on Functions and Graphs

3. Find the slope and y-intercept: $-2y + 3x = 4$

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4. Graph $f(x) = |x| + 4$



5. Determine without graphing whether the pair of lines are parallel or perpendicular:

i. $x = 5y - 2$

ii. $5x = 8 - y$

6. The area of a balloon varies directly as the square of its radius. The area is 3.4 in^2 when the radius is 5 in. What is the area when the radius is 12 in.?

Inequalities and Absolute Value

7. A car rents for \$18 per day plus \$0.20 per mile. You are on a daily budget of \$65. What mileages will allow you to stay within the budget?

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8. Solve and graph:

i. $-12 \leq 3x - 24 < 0$

ii. $x > 3$

9. Solve.

i. $|8 - 3x| = 5$

ii. $|-5x + 1| \geq 6$

Rational Exponents, Radicals, and Complex Numbers

10. Simplify: $\sqrt[3]{\frac{-125}{x^9}}$

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11. Multiply and simplify: $\sqrt[3]{4x^2} \cdot \sqrt[3]{6x^5}$

12. Solve: $x = \sqrt{2x - 5} + 4$

13. Express in terms of i and simplify: $\sqrt{-72}$

14. Multiply. Write answer in the form $a + bi$: $(9 - i)^2$

Quadratic Equations and Functions

15. Solve, writing the exact answer in simplified form:

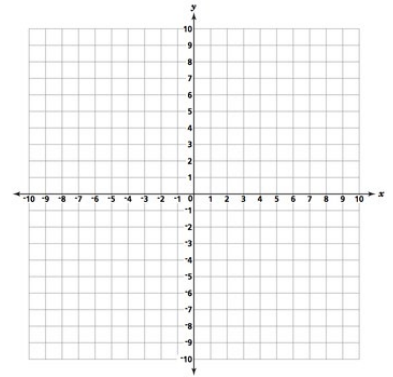
$$4x^2 - 8x - 3 = 0$$

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16. Write a quadratic equation having solutions $-\frac{2}{3}$ and 8.

17. Graph:

- i. $f(x) = -3(x - 1)^2 + 4$
- ii. Label the vertex.
- iii. Draw the line of symmetry.



Exponential and Logarithmic Functions

18. Find $(f \circ g)(x)$ and $(g \circ f)(x)$ if $f(x) = x^2 - 2x$ and $g(x) = 4x - 3$.

19. Find the inverse of $f(x) = 9x^2 - 16$.

Placement Review Prep Questions

MTH 115 – General Education Mathematics

Sets

1. Use the following information to answer the questions:

$$U = \{1, 3, 5, 7, 9, 11, 13, 15\}$$

$$A = \{3, 5, 7, 9\}$$

$$B = \{7, 9, 11, 15\}$$

$$C = \{3, 11, 15\}$$

i. $A \cap B$

ii. $A \cap (B \cap C')$

iii. $A - B$

Logic

2. Determine whether the pair of statements are equivalent. $\sim p \vee q$, $\sim (p \wedge \sim q)$

3. Determine if any of the following three statements are equivalent:

i. If the bird is red, then it is a cardinal.

ii. The bird is not red or it is a cardinal.

iii. If the bird is not red, then it is not a cardinal.

Placement Review Prep Questions

Consumer Mathematics

4. Yolanda received a \$5400 loan with a 12.5% interest rate for 90 days on August 1. Yolanda made a payment of \$3000 on September 15.

i. How much did she owe the bank on the date of maturity?

ii. What total amount of interest did she pay on the loan?

5. Use the compound interest formula to compute the accumulated amount and the interest earned:

i. Principal: \$7500 Time: 2 years
Rate: 3% Compounded: Quarterly

ii. Principal: \$2500 Time: 3 years
Rate: 6.5% Compounded: Monthly

Placement Review Prep Questions

Probability

6. Each of the numbers 1 – 9 is written on a sheet of paper and the nine sheets of paper are placed in a hat. If one sheet of paper is selected at random from the hat, determine the probability that the number selected is:

i. Greater than 5

ii. Odd

iii. Even or less than 4

7. The number of cars and the number of SUVs going through the toll gates of the George Washington Bridge and the Golden Gate Bridge is recorded.

Bridge	Cars	SUVs	Total
George Washington	120	106	226
Golden Gate	94	136	230
Total	214	242	456

If one of these vehicles going through the toll gate of one of these two bridges is selected at random, determine the probability that:

i. It is an SUV

ii. It is going through the toll gate of the George Washington Bridge

Placement Review Prep Questions

iii. It is an SUV, given that it is going through the toll gate of the George Washington Bridge

iv. It is going through the toll gate of the Golden Gate Bridge, given that it is a car

8. A bin contains a total of 20 batteries, of which 6 are defective. If you select 2 batteries at random, without replacement, determine the probability that:

i. Both of the batteries are defective

ii. At least one battery is not defective.

Statistics

9. For the set of data: 27, 43, 43, 45, 52, determine the following:

i. Mean

ii. Median

iii. Mode

iv. Midrange

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v. Range

vi. Standard deviation

10. Use the data set below:

26	28	35	46	49	56
26	30	36	46	49	58
26	32	40	47	50	58
26	32	44	47	52	62
27	35	46	47	54	66

i. A frequency distribution; let the first class be 25 – 30

ii. A histogram of the frequency distribution

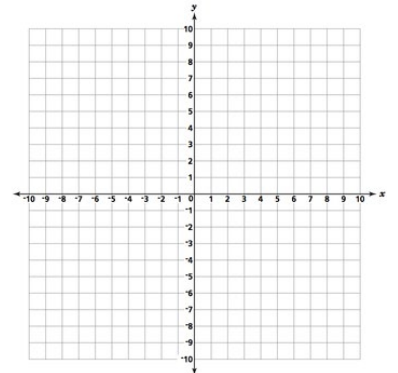
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MTH 165 – College Algebra

Graphs

1. Suppose the points $(-3, -5)$ and $(2, 4)$ are the endpoints of a line segment.
 - i. Find the distance between the two points.
 - ii. Find the midpoint of the line segment connecting the two points.

2. Find the center and the radius of the circle $x^2 + y^2 + 4x + 2y - 20 = 0$. Graph this circle.



3. For the line $x - 4y = 12$, find a line parallel to it containing the point $(1, -1)$. Also find a line perpendicular to it containing the point $(0, 3)$.

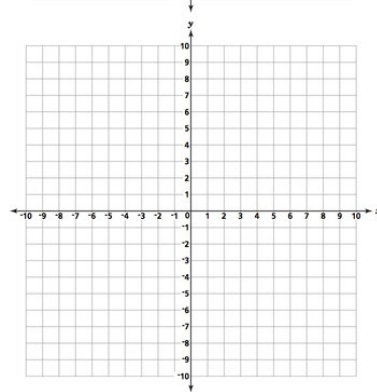
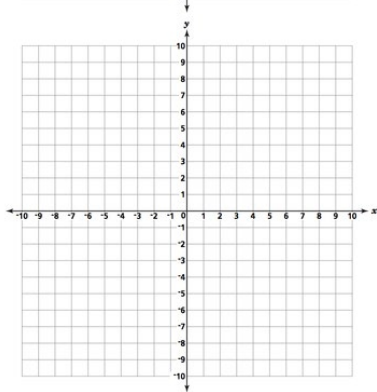
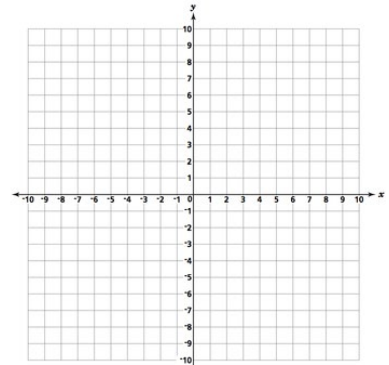
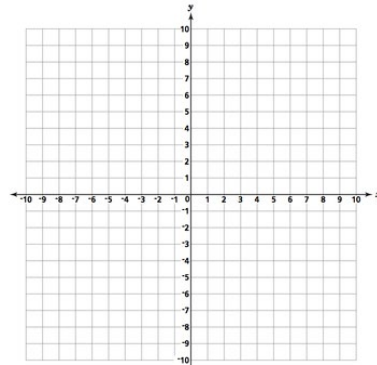
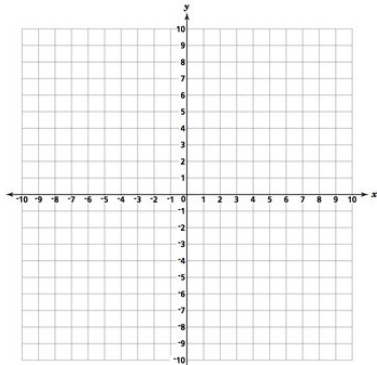
Functions and Their Graphs

4. For the function $f(x) = 2x^2 + 3x - 4$, find the average rate of change of f from 3 to 4.

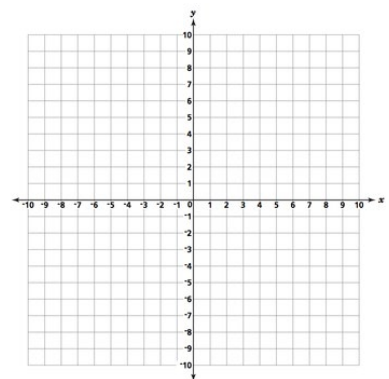
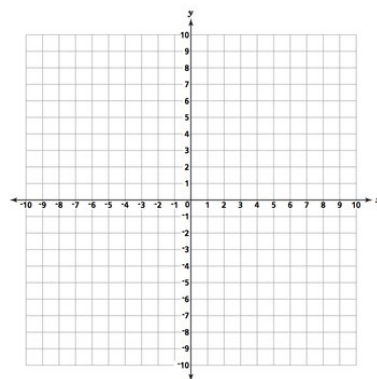
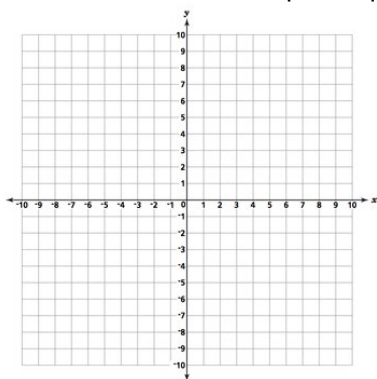
Placement Review Prep Questions

5. Graph each function using the techniques of shifting, compressing or stretching, and reflections. Start with the graph of the basic function and show all stages.

i. $h(x) = -\frac{1}{3}(x - 3)^2 - 2$



ii. $|x + 7| + 5$

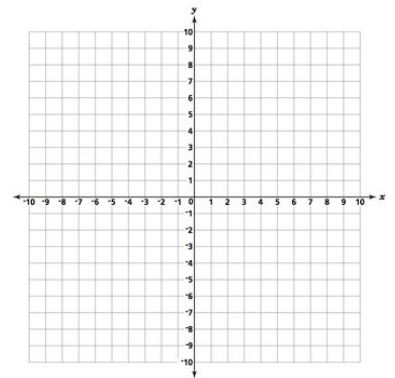


Placement Review Prep Questions

6. A community skating rink is in the shape of a rectangle with semicircles attached at the ends. The length of the rectangle is 15 feet less than twice the width. The thickness of the ice is 0.75 inch.
- Build a model that expresses the ice volume, V , as a function of the width, x .
 - How much ice is in the rink if the width is 90 feet?

Linear and Quadratic Functions

7. $f(x) = 3x^2 - 12x + 4$
- Determine whether the graph opens up or down.
 - Determine the vertex of the graph of the quadratic function (without a calculator, show work!)
 - Determine the axis of symmetry of the graph of the quadratic function.
 - Determine the intercepts of the graph of the quadratic function.
 - Use the information in parts i.-iv. to graph the quadratic function.
 - Based on the graph, determine the domain and the range of the quadratic function.
 - Based on the graph, determine where the function is increasing and where it is decreasing.



Placement Review Prep Questions

8. Solve $x^2 - 11x + 24 \geq 0$.

9. The weekly rental cost of a 20-foot recreational vehicle is \$134.50 plus \$0.12 per mile.

- i. Find a linear function that expresses the cost C as a function of miles driven, m .
- ii. What is the rental cost if 860 miles are driven?
- iii. How many miles were driven if the rental cost is \$196.54?

Polynomial and Rational Functions

10. Find the domain of $g(x) = \frac{2x^2 - 14x + 24}{x^2 + 6x - 40}$. Also, find any horizontal, vertical, or oblique asymptotes.

11. Write a function that meets the following conditions: fourth-degree polynomial with real coefficients; zeros: $-3, 0, 2+i$

Placement Review Prep Questions

12. Use the Intermediate Value Theorem to show that the function $f(x) = -2x^2 - 3x + 8$ has at least one real zero on the interval $[0, 4]$.

Exponential and Logarithmic Functions

13. Write $\log(x^2 - 9) - \log(x^2 + 7x + 12)$ as a single logarithm.

14. Solve each equation:

i. $5^{x+2} = 125$

ii. $\log(7x - 12) = 2 \log x$

iii. $\log_2(x - 4) + \log_2(x + 4) = 3$

15. A 50-mg sample of a radioactive substance decays to 34 mg after 30 days. How long will it take for there to be 2 mg remaining?

Placement Review Prep Questions

II. Systems of Equations and Inequalities

1. Solve the system algebraically:

$$\begin{cases} 3x + 2y - 8z = -3 \\ -x - \frac{2}{3}y + z = 1 \\ 6x - 3y + 15z = 8 \end{cases}$$

2. Solve the system using matrices (show all work):

$$\begin{cases} 6x + 3y = 12 \\ 2x - y = -2 \end{cases}$$

3. Use Cramer's Rule, if possible, to solve the system:

$$\begin{cases} 4x + 3y = -23 \\ 3x - 5y = 19 \end{cases}$$

Placement Review Prep Questions

Answer Key

MTH 093 – Pre - Algebra

Whole Numbers and Number Sense

1. 5,700
2. \$2,565
3. 54 ft²

Factors and the Order of Operations

4. 67
5. $2^3 \cdot 3 \cdot 5^2$

Fractions: Multiplication and Division

6. 28
7. $\frac{7}{3}$
8. $\frac{11}{63}$

Fractions: Addition and Subtraction

9. $3\frac{1}{2}$

Integers and Algebraic Expressions

20. -24
22. 255
23. $52x + 68$

Equations

26. $x = -8$
27. $x = 8$
28. $x = 8$
29. $x = -34$

Additional Topics for Review

Ratios, Proportions, and Percents

- a. $\frac{2 \text{ oz.}}{1 \text{ lb.}}$
- b. $x = 33$
- c. $\frac{9 \text{ yds}}{17 \text{ ft}}$

MTH 095 – Elementary Algebra

Review of Real Numbers

1. 1
2. 79

$$10.57\frac{3}{8}$$

$$11.23\frac{1}{4}$$

Decimals

$$12.\$2.77$$

$$13..625$$

$$14..1968$$

Ratios, Proportions, and Percents

$$15.7\%$$

$$16.200$$

$$17.\$1500 \text{ discount, } \$1000 \text{ sale price}$$

$$18.76$$

$$19.\$324$$

$$21.43$$

$$24.-80$$

$$25.\$15 \text{ loss}$$

Polynomials

$$d. \frac{72}{5} \text{ or } 14.4$$

$$e. 8x^2 - 10x + 18$$

$$f. x^2 + 6x - 27$$

$$g. \frac{y^2}{3x^8}$$

Equations, Inequalities, and Problem Solving

$$3. -3x - 32$$

$$4. 35 + 7c$$

$$5. -8$$

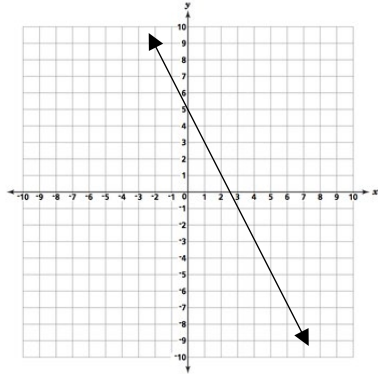
Placement Review Prep Questions

6. $x = 122$
7. -2
8. Width = 40 m, length = 155 m
9. \$200

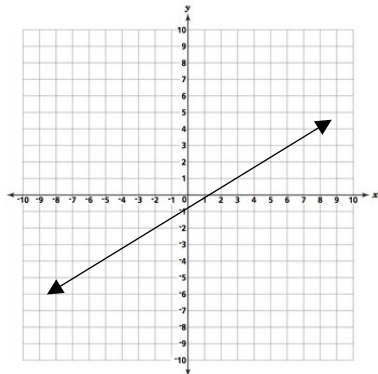
Graphing

10.

i.

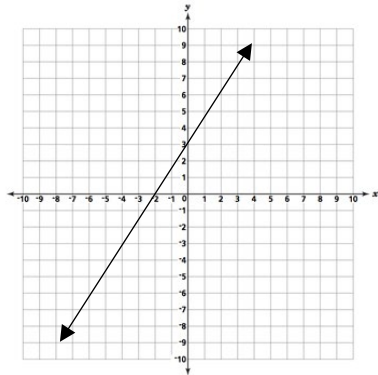


ii.

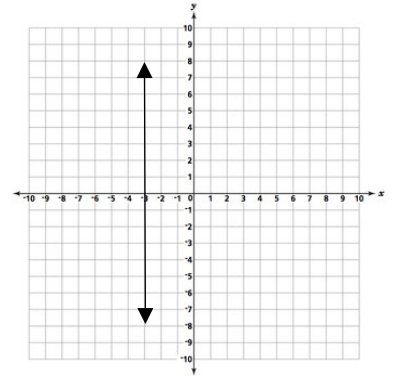


11.

i.



ii.



12.-13

Solving Systems of Linear Equations

13. $(5, 0, 4)$

14. $(3, 2)$

15. 12 \$5 bills and 4 \$10 bills

Exponents and Polynomials

16.

i. $7x^2 - 10x + 6$

ii. $\frac{z^5}{4x^4}$

iii. $14x^3 + 8x^2 - 30x$

iv. $21x^2 - 2x - 55$

v. 2.4×10^{-4}

Factoring Polynomials

17.

i. $12x(x - 5)(x + 2)$

ii. $4(x - 11)^2$

iii. $x^2(a + 8) - 9(z + 8)$

iv. $x = 0, x = 9, x = -5$

MTH 100 – Intermediate Algebra

Rational Expressions

1.

i. $\frac{9(x+2)}{16}$, all real numbers

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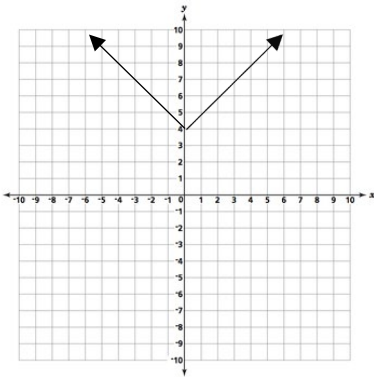
ii. $\frac{17x+8}{3x+12}, x \neq -4$

2. $x = 10, x = -7$

More on Functions and Graphs

3. $m = \frac{3}{2}, b = -2$

4.



5. Perpendicular

6. 19.584 in^2

Inequalities and Absolute Value

7. 235 miles or less

8.

i. $4 \leq x < 8$, number line graph (not shown here)

ii. Number line graph (not shown here)

9.

i. $x = 1, x = \frac{13}{3}$

MTH 115 – General Education Mathematics

Sets

1.

i. $\{7, 9\}$

ii. $\{7, 9\}$

iii. $\{3, 5\}$

Logic

2. Equivalent

3. i and ii are equivalent

Consumer Mathematics

4.

i. \$2523.20

ii. $x \geq \frac{7}{5}, x \leq 1$, number line graph (not shown here)

II. Rational Exponents, Radicals, and Complex Numbers

1. $\frac{-5}{x^3}$

2. $2x^2\sqrt[3]{3x}$

3. $x = 7$

4. $6i\sqrt{2}$

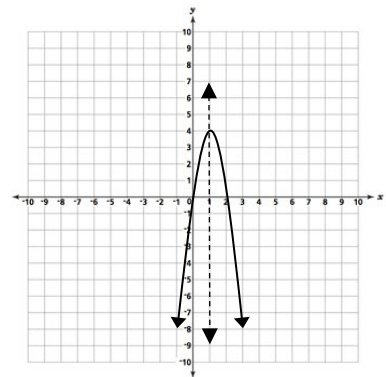
5. $80 - 18i$

III. Quadratic Equations and Functions

1. $1 \pm \frac{\sqrt{7}}{2}$

2. $3x^2 - 22x - 16$ (answers may vary)

3. Axis of symmetry: $x = 1$, vertex: $(1, 4)$



IV. Exponential and Logarithmic Functions

1. $(f \circ g)(x) = 16x^2 - 32x + 15,$
 $(g \circ f)(x) = 4x^2 - 8x - 3$

2. $f^{-1}(x) = \pm \sqrt{\frac{x+16}{9}}$

Placement Review Prep Questions

Statistics

Probability

5. ii. \$123.20
- i. \$7961.99, \$461.99
ii. \$3036.68, \$536.68
6. i. $\frac{4}{9}$
ii. $\frac{5}{9}$
iii. $\frac{2}{3}$
7. i. $\frac{121}{228}$
ii. $\frac{113}{228}$
iii. $\frac{53}{113}$
iv. $\frac{47}{107}$
8. i. $\frac{3}{38}$
ii. $\frac{35}{38}$

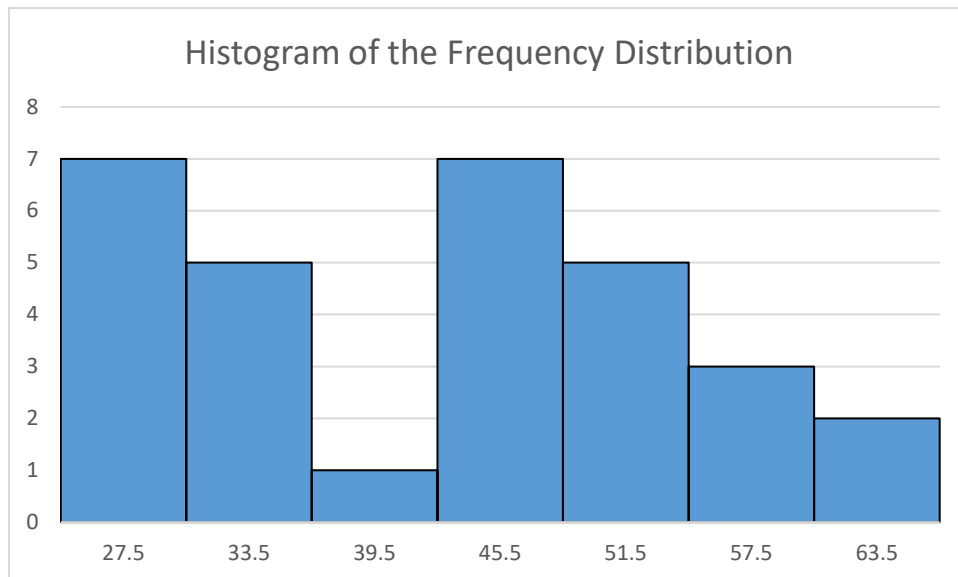
9. i. 42
ii. 43
iii. 43
iv. 39.5
v. 25
vi. $\sqrt{84} \approx 9.165$

10.

i.

Class	Frequency
25 - 30	7
31 - 36	5
37 - 42	1
43 - 48	7
49 - 54	5
55 - 60	3
61 - 65	2

ii. See Below



Placement Review Prep Questions

MTH 165 – College Algebra

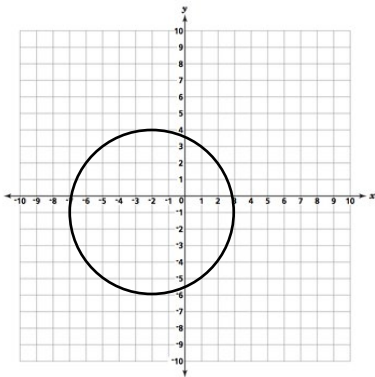
Graphs

1.

i. $\sqrt{106}$

ii. $\left(-\frac{1}{2}, -\frac{1}{2}\right)$

2. $C = (-2, -1), r = 5$

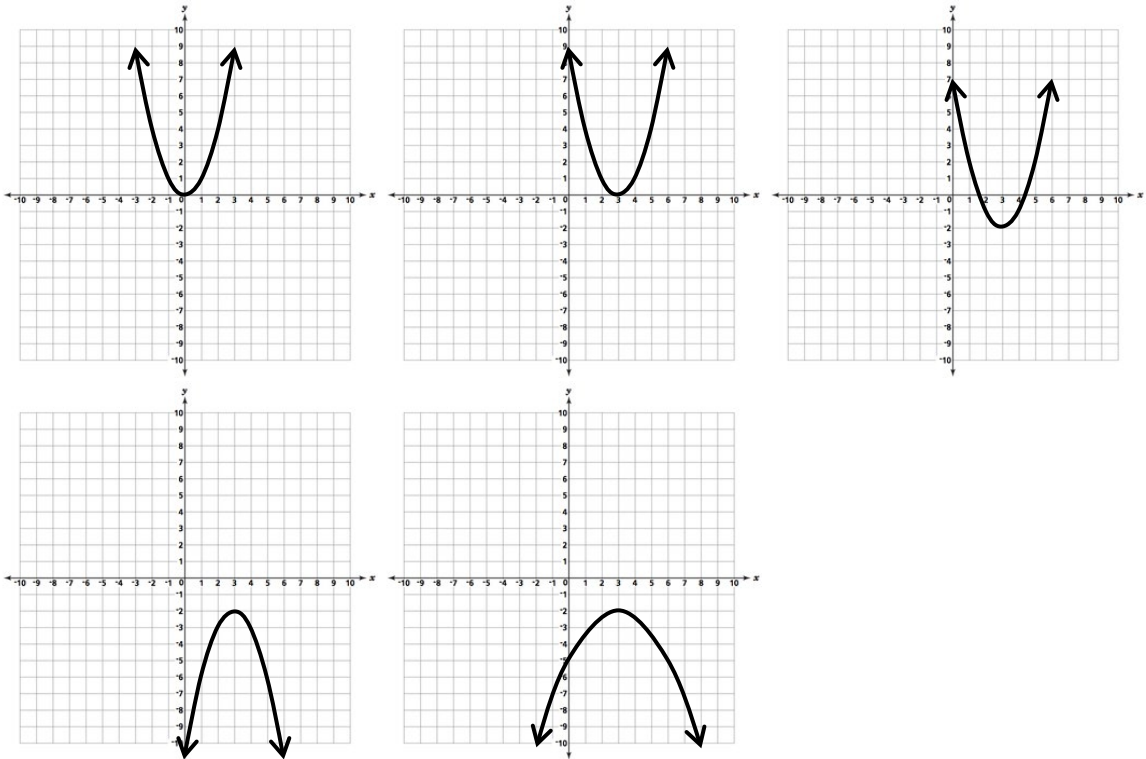


3. Parallel: $y = \frac{1}{4}x - \frac{5}{4}$, perpendicular: $y = -4x + 3$

Functions and their Graphs

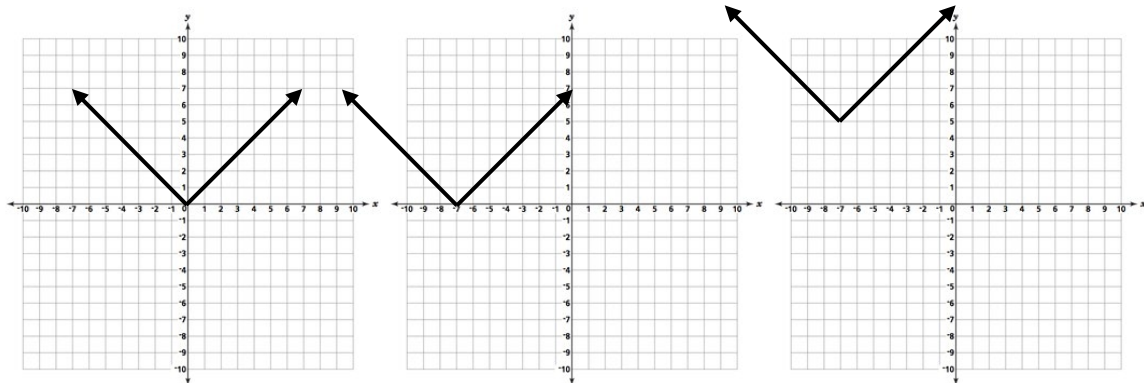
4. 17

5.



i.

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6. ii.

i. $V(x) = .0625(\pi \frac{x^2}{4} + 2x^2 - 15x)$

ii. 1325.73 ft^3

Linear and Quadratic Functions

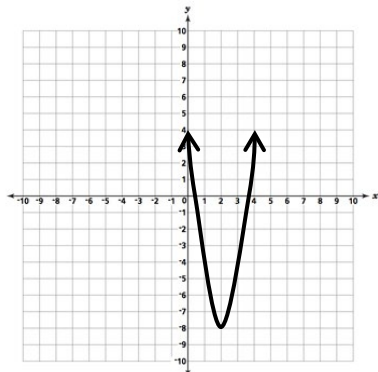
7.

i. Up

ii. (2, -8)

iii. $X=2$

iv. Y-int: (0,4), x-ints: (3.63, 0), (.37, 0)



v.

vi. Domain: $(-\infty, \infty)$ Range: $[-8, \infty)$

vii. Decreasing: $(-\infty, 2)$ Increasing: $(2, \infty)$

8. $(-\infty, 3] \cup [8, \infty)$ or $\{x|x \leq 3 \text{ or } x \geq 8\}$

9.

i. $C(m) = 134.5 + .12m$

ii. \$237.7

iii. 517 miles

Polynomial and Rational Functions

10. Domain: $\{x|x \neq 10, x \neq 4\}$, vert. asymptote at $x = -10$, horizontal asymptote at $y = 2$

11. $x^4 - x^3 - 7x^2 + 15x$.

12. First, verify that the function is continuous. Since the function is a parabola, it is continuous. Since $0 < 4$, we determine that $f(0)=8$ and $f(4)= -36$. $f(0)$ and $f(4)$

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have opposite signs, therefore IVT proves that there is at least one real zero on the interval $[0, 4]$.

Exponential and Logarithmic Functions

13. $\log\left(\frac{x-3}{x+4}\right)$

14.

i. $X = 1$

ii. $X = 3, 4$

iii. $x = 2\sqrt{6}$

15. About 250.39 days (do not round until the end!)

Systems of Equations and Inequalities

16. $(1/3, -2, 0)$

17. $(1/2, 3)$ work shown should use matrix algebra!

18. $(-2, -5)$ work shown should use Cramer's Rule (determinants)