

Please show all work in the spaces provided. If work is on a separate sheet, clearly enumerate and staple to the back of this packet.

**ALGEBRAIC MANIPULATION**

*Solve for the indicated variable. Express all answers as fractions in lowest terms.*

*To evaluate, substitute the given value(s) of the variable(s) and use order of operations to find the value of the resulting numerical expression.*

1. Solve for  $x$ .

$$2[x + 3(x - 1)] = 18$$

2. Solve for  $x$ .

$$-(1 + 7x) - 6(-7 - x) = 36$$

3. Solve for  $x$ .

$$\frac{x - 2}{3} = \frac{2x + 1}{4}$$

4. Solve for  $x$ .

$$6 + 2x(x - 3) = 2x^2$$

5. Solve for  $x$ .

$$2x^2 = 50$$

6. Solve for  $x$ .

$$|x + 4| + 8 = 2x + 4$$

7. The relationship between the sale price  $S$ , the list price  $L$ , and the discount rate  $r$  is given by  $S = L - rL$ . Solve for  $r$ .

8. Solve for  $m$ .

$$g = 4cm - 3m$$

9. Evaluate  $\frac{-b + \sqrt{b^2 - 4ac}}{2a}$  if  $a = 1$ ,  $b = -4$ ,  $c = -21$

10. Evaluate  $A = P \left(1 + \frac{r}{n}\right)^{nt}$   
if  $P = 650$ ,  $r = 6\%$ ,  $n = 2$ ,  $t = 15$

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**OPERATIONS WITH POLYNOMIALS**

*Perform the indicated operations and simplify completely (meaning collect similar terms).*

11.  $(-x)(-3y)(-5z)$

12.  $(4n - 3)^2$

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13.  $(7x - 3)(7x + 3)$

14.  $(5x^2 - 4) - 2(3x^2 + 8x + 4)$

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15.  $(x^2 + x - 3)(3x^2 - x + 3)$

16.  $(n^2 - 4n - 6) + (-3n^2 + 2n - 9)$

## Properties of Exponents

Let  $a$  and  $b$  be real numbers and let  $m$  and  $n$  be rational numbers, such that the quantities in each property are real numbers.

Property Name	Definition	Example
Product of Powers	$a^m \cdot a^n = a^{m+n}$	$2^3 \cdot 2^2 = 2^{(3+2)} = 2^5 = 32$
Power of a Power	$(a^m)^n = a^{mn}$	$(x^4)^2 = x^{(4 \cdot 2)} = x^8$
Power of a Product	$(ab)^m = a^m b^m$	$(2x)^3 = 2^3 \cdot x^3 = 8 \cdot x^3 = 8x^3$
Negative Exponent	$a^{-m} = \frac{1}{a^m}, \text{ where } a \neq 0$	$x^{-2} = \frac{1}{x^2}$
Zero Exponent	$a^0 = 1, \text{ where } a \neq 0$	$213^0 = 1$
Quotient of Powers	$\frac{a^m}{a^n} = a^{m-n}, \text{ where } a \neq 0$	$\frac{4^7}{4^5} = 4^{(7-5)} = 4^2 = 16$
Power of a Quotient	$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}, b \neq 0$	$\left(\frac{2}{3}\right)^3 = \frac{2^3}{3^3} = \frac{8}{27}$

## OPERATIONS WITH EXPONENTS

Simplify each expression using the exponent rules. Answers should be written using positive exponents.

17.  $\frac{y^{12}}{y^8}$

18.  $(-4a^5b^0c)^2$

19.  $(2x^4)^{-3}$

20.  $(x^{2y})(2x^y)(x^{y+3})$

$$21. \left(\frac{3}{x-3}\right)^7$$

$$22. \frac{5x^3y^9}{30x^4y^{-2}}$$

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### **SYSTEMS OF EQUATIONS**

*Solve each system of equations algebraically (using the substitution or elimination method)*

23. Solve the system of equations by substitution.

$$\begin{aligned}y &= 2x + 4 \\ -3x + y &= -9\end{aligned}$$

24. Solve the system of equations by elimination.

$$\begin{aligned}2x + 3y &= 6 \\ -3x + 2y &= 17\end{aligned}$$

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### **FACTORING POLYNOMIALS**

*Factor the following completely.*

25.  $16y^2 + 8y$

26.  $x^2 - 1$

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27.  $a^2 - 6a - 40$

28.  $49x^2 - 100y^2$

29.  $6x^2 + 13x - 5$

30.  $3x^3 + x^2 - 15x - 5$

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**INEQUALITIES**

*Solve and graph the following inequalities on a number line. Write your final answer in interval notation.*

31.  $4(x + 5) > 2x - 8$

32.  $2x - 3 > 9$  or  $3x \geq 12$

33.  $-3 \leq 2x - 11 < 7$

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**34. SOLVE BY COMPLETING THE SQUARE**

$$x^2 + 10x - 25 = 0$$

**35. SOLVE USING THE QUADRATIC FORMULA**

$$2x^2 - 14x + 40 = 3x^2 - 16x + 32$$

### SIMPLIFYING RADICALS

An expression under a radical sign is in simplest radical form when:

- there is no integer under the radical sign with a perfect square factor,
- there are no fractions under the radical sign,
- there are no radicals in the denominator

36.  $\sqrt{50}$

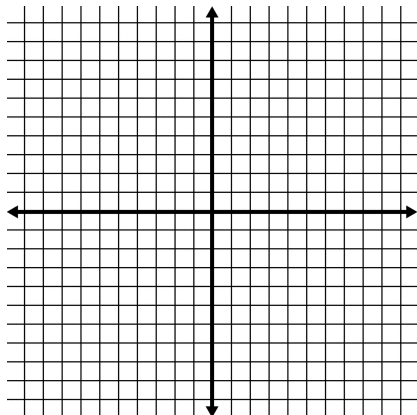
37.  $(3 + 2\sqrt{3})(2 - 5\sqrt{3})$

38.  $3\sqrt{2} + 4\sqrt{8} - 5\sqrt{50}$

39.  $\sqrt{\frac{6}{27}}$

### LINES AND COORDINATE GEOMETRY

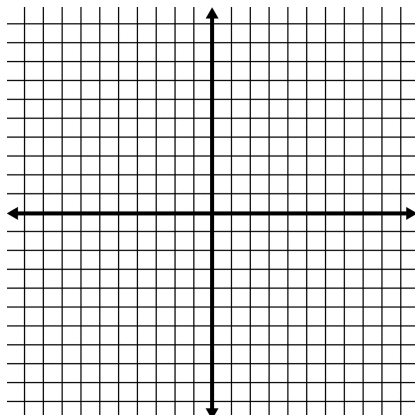
40. Graph  $y = -2x + 4$



Slope =  $m =$  \_\_\_\_\_

y-intercept =  $b =$  \_\_\_\_\_

41. Graph  $x + 3y = 6$



Slope =  $m =$  \_\_\_\_\_

y-intercept =  $b =$  \_\_\_\_\_

42. Determine whether the lines are parallel, perpendicular, or neither. Explain your reasoning.

$$2x + 3y = 12$$

$$3x + 2y = 24$$

43. In 1998, Matt had \$429 in his bank account. By 2010, he had \$2540. Find the rate of change for his bank account.

**DOMAIN AND RANGE**

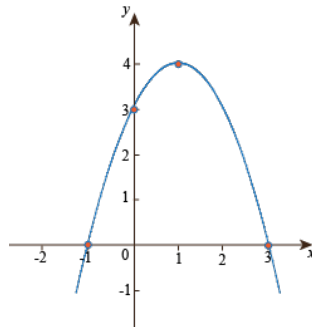
All of the values that can go into a relation or function (input) are called the domain.  
 All of the values that come out of a relation or function (output) are called the range.

44.  $(1, 2), (-3, 8), (-9, 6), (\frac{1}{2}, 5)$

Domain: \_\_\_\_\_

Range: \_\_\_\_\_

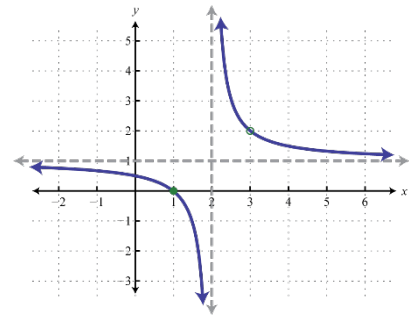
45.



Domain: \_\_\_\_\_

Range: \_\_\_\_\_

46.



Domain: \_\_\_\_\_

Range: \_\_\_\_\_

**EVALUATING FUNCTIONS**

To evaluate, substitute the given value(s) of the variable(s) and use order of operations to find the value of the resulting numerical expression.

47. If  $f(x) = -2x^2 + x + 3$ , evaluate each of the following:

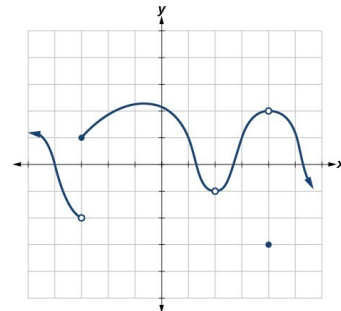
a)  $f(-2) =$

b)  $f(3m) =$

c)  $f(p^5) =$

d)  $f(x + h) =$

48. The graph of a function  $g$  is given.



a)  $g(-3) =$

b)  $g(1) =$

c) Find the values of  $x$  for which is  $g(x) = -1$

49. Evaluate the following functions given:

$$f(x) = 4x - 12x^2 + 7x^3$$

$$g(x) = 2\left(\frac{1}{3}\right)^x$$

$$h(x) = \frac{4-x}{-x^2}$$

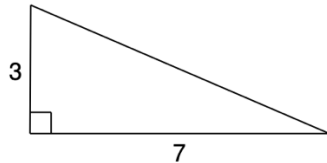
a)  $g(2) =$

b)  $h(f(1)) =$

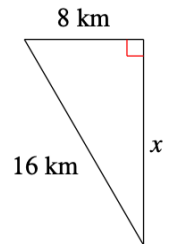
### RIGHT TRIANGLE TRIGONOMETRY

Use the Pythagorean Theorem and SOHCAHTOA to help you solve for an unknown side/angle.

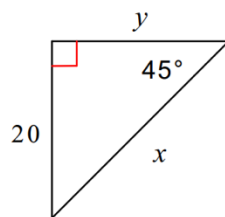
50. Find the missing side. Round answer to the nearest tenth.



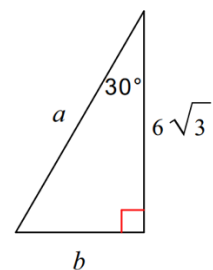
51. Find the missing side. Answer must be in simplest radical form.



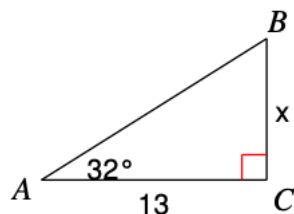
52. Find the missing side in exact form.



53. Find the missing side in exact form.



54. Find the missing side in exact form.



55. Find the missing angle. Round to the nearest tenth.

