

**Show your work to receive full credit. Point-values for each problem are shown at the right in parenthesis.**

For problems 1-9, perform the indicated operation and simplify your answer as much as possible. Answer using positive exponents only.

1. Multiply:  $(2\sqrt{x} + y)(2\sqrt{x} - y)$

1. \_\_\_\_\_ (3)

2. Subtract:  $(3y^2 - 2y + 4) - 4(y^2 - 2y + 1)$

2. \_\_\_\_\_ (3)

3. Simplify:  $\frac{-6xy^4 - 3x^2y^3 + 9x^4y^2}{3xy^2}$

3. \_\_\_\_\_ (3)

4. Simplify  $-2\sqrt{8} + 5\sqrt{2} - 3\sqrt{32}$ . Answer in simplified radical form.

4. \_\_\_\_\_ (3)

5. Simplify and write using positive exponents only:  $(5^2r^3t^{-2})(5^{-1}r^{-3}t^4)$

5. \_\_\_\_\_ (3)

6. Rewrite the expression without a radical, using exponents only:  $\sqrt[4]{7A^2B^4}$

6. \_\_\_\_\_ (3)

7. Divide:  $\frac{a-3}{5} \div \frac{2a-6}{15a}$

7. \_\_\_\_\_ (3)

8. Subtract:  $\frac{2}{x} - \frac{1}{2x+3}$

8. \_\_\_\_\_ (3)

9. Factor completely:

(a)  $2p^2 - 6p - 20$

9(a) \_\_\_\_\_ (3)

(b)  $4x^2 - 9y^6$

9(b) \_\_\_\_\_ (3)

For problems 10-16, solve each equation for the unknown variable.

10.  $\sqrt{7q+6} = 3\sqrt{q}$

10. \_\_\_\_\_ (3)

11.  $5z^2 - 10z = 0$

11. \_\_\_\_\_ (3)

12.  $\frac{9p}{5} = \frac{3p-4}{2} + \frac{5}{2}$

12. \_\_\_\_\_ (4)

13. Solve for  $x$ :  $2^{5-2x} = 8$

13. \_\_\_\_\_ (4)

14. Solve by factoring:  $t^3 - 8t = 2t^2$

14. \_\_\_\_\_ (4)

15. Solve the system of linear equations algebraically. Write your solution as an ordered pair:

$$\begin{cases} x + y = 4 \\ 3x = -2y + 24 \end{cases}$$

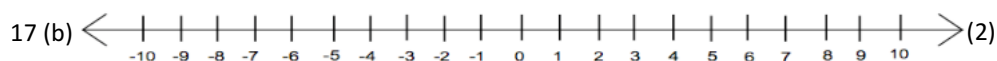
15.  $(x, y) =$  \_\_\_\_\_ (4)

16. Solve  $3p^2 + 2p - 6 = 0$  using the quadratic formula,  $p = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ . Round your answer to the nearest hundredth (two decimal places).

16.  $p \approx$  \_\_\_\_\_ or \_\_\_\_\_ (3)

17. Solve the inequality. (a) Answer in the interval notation and (b) graph your solution on the number line:  $-13 < -3x + 2 \leq 5$

17 (a) \_\_\_\_\_ (2)



18. The State of Colorado covers about  $1.04 \times 10^5$  square miles. The Indian Ocean covers about  $2.808 \times 10^7$  square miles. How many times bigger than Colorado is the Indian Ocean? . **Answer in Scientific Notation.**

18. \_\_\_\_\_ (4)

19. In a conservative portfolio the ratio of the amount invested in bonds and in stocks should be 3 to 1. A conservative investor, Jayde invested \$2850 more in bonds than in stocks. How much did he invested in stocks?

19. \_\_\_\_\_ (4)

20. The total receipts from a concert were \$2100. The price for a regular ticket was \$6 and the student tickets were half the regular price. If 400 tickets were sold, how many of each type were there? Let  $X$  be the number of regular tickets and  $Y$  be the number of student tickets. **Write a system of equations. Do not solve the system.**

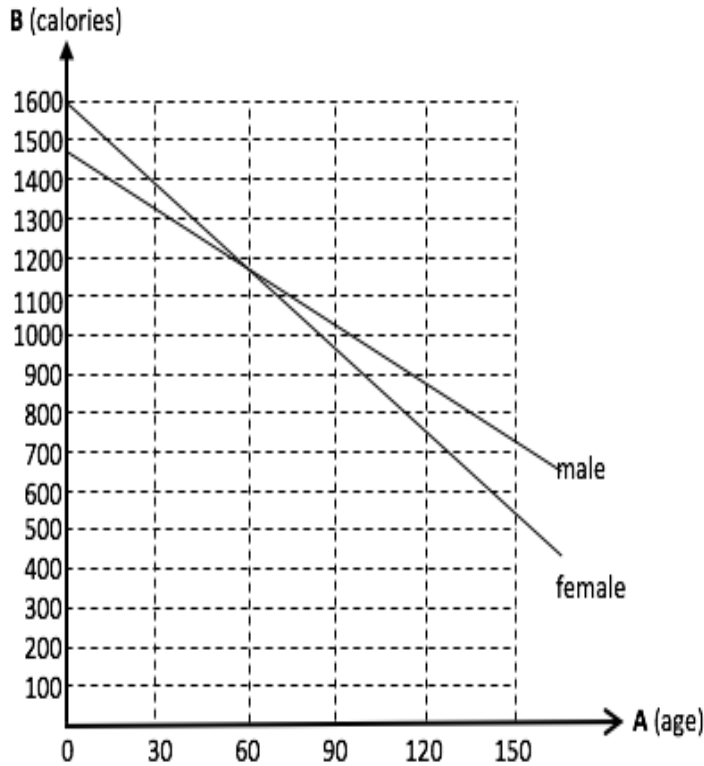
Equation 1: \_\_\_\_\_ (2)

Equation 2: \_\_\_\_\_ (2)

21. Joe sells an office building for \$850,000. He receives a commission of 1.3% on the sale. What is his commission?

21. \_\_\_\_\_ (4)

22. The basal energy requirement  $B$  is the number of calories that a person needs.  $B$  depends on the height, weight, and age of the person. The basal energy requirement (in calories) for a 55-kg 160-cm male at age  $A$  is given by  $B = 1480 - 5A$ ; the basal energy requirement for a female with same weight and height is given by  $B = 1600 - 7A$ .



(a) Which person has a higher basal energy requirement at age 30?  
\_\_\_\_\_ (2)

(b) Use the equation to find the amount of basal energy a male requires at age 75?  
\_\_\_\_\_ units (2)

(c) Use the graph to read the age at which the basal energy requirements are equal.  
\_\_\_\_\_ (2)

23. A contractor found that his labor cost for installing 100 feet of pipe was \$60. He also found that his labor cost for installing 500 feet of pipe was \$180. Suppose cost  $C$  (in dollars) and the length  $L$  (in feet) are in linear relation.

Length	Installing Cost
100 feet	\$ 60
500 feet	\$ 180
240 feet	(c)

(a) Use the table to find a linear equation for the cost  $C$  in terms of the length  $L$ .

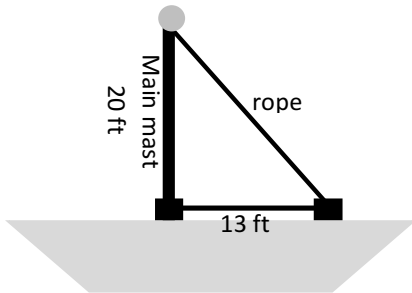
$C =$  \_\_\_\_\_ (3)

(b) What does the slope represent in the context of this problem? Use a complete sentence including units.

\_\_\_\_\_  
\_\_\_\_\_ (2)

(c) What would his labor cost be for installing 240 feet of pipe?  
\$ \_\_\_\_\_ (2)

24. The main mast of a fishing boat is supported by a sturdy rope that extends from the top of the mast to the deck. If the mast is 20 feet tall and the rope is attached to the deck 13 feet away from the base of the mast, how long is the rope? Approximate your answer to **3 decimal places**.



\_\_\_\_\_ ft (4)

25. For  $y = -x^2 + 2x + 15$ , find the following.

(a) x-intercepts

( \_\_\_\_\_ , \_\_\_\_\_ ) (3)

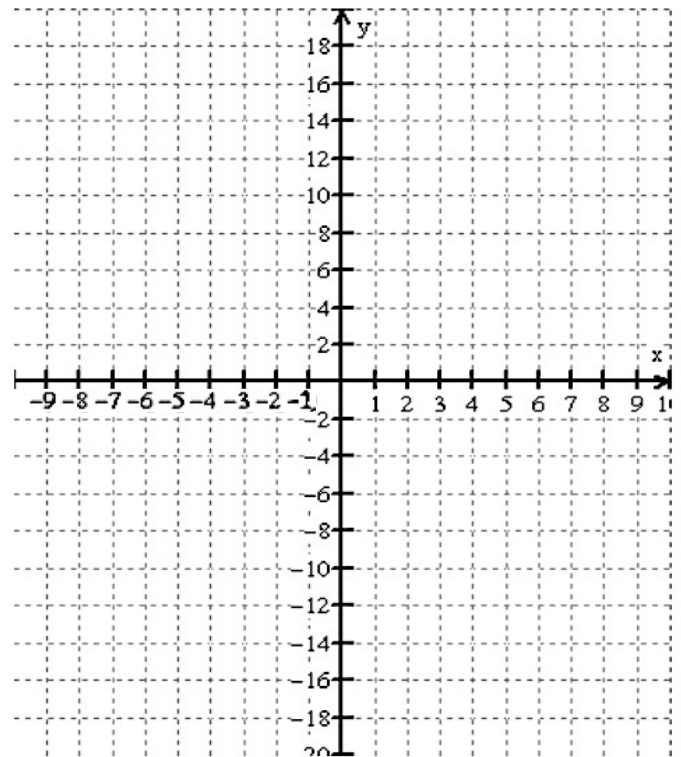
( \_\_\_\_\_ , \_\_\_\_\_ )

(b) y-intercept

( \_\_\_\_\_ , \_\_\_\_\_ ) (1)

(c) Vertex

( \_\_\_\_\_ , \_\_\_\_\_ ) (2)



(d) Sketch the graph on the axes provided. (2)