



2023-2024

## 4.3 Writing & Solving Equations

SCORE:

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Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

1. An open box is made from a rectangular piece of cardboard measuring 12 inches by 16 inches, by cutting identical squares from the corners and turning up the sides. What are the lengths of the sides of the removed squares if the area of the bottom of the open box is  $60 \text{ in}^2$ ?
  
  
  
  
  
  
  
  
  
  
2. The width of a box is 2 inches less than twice the height. The length is 4 inches less than three times the height. The volume is  $2240 \text{ in}^3$ . What are the dimensions of the box?
  
  
  
  
  
  
  
  
  
  
3. You want to create a custom border for a picture of you and your closest friends. The picture measures 5 inches by 7 inches. What should the width of the border be if the final area, including the border, is twice the area of the picture? Round to the nearest hundredth.

4. A triangular tabletop has a base that is twice as long as its height. If the area of the tabletop surface is  $324 \text{ in}^2$ , what is the value of the height and the base?

5. A family had three children and were expecting a fourth. The oldest was 3 years older than the youngest. The youngest was one year younger than the middle child. How old was each child on the day their new sibling was born if the product of their ages was 987 more than three times the sum of their ages?

6. Uptown Cable, a cable TV provider, charges each customer \$120 for installation, plus \$25 per month for cable programming. Uptown's competitor, Downtown Cable, charges each customer \$60 for installation, plus \$35 per month for cable programming. A customer who signs up with Uptown will pay the same total amount for cable TV as a customer who signs up with Downtown if each pays for installation and cable programming for how many months?

7. In a bag of 400 jellybeans, 25% of the jellybeans are red in color. If you randomly pick a jellybean from the bag, what is the probability that the jellybean picked is NOT one of the red jellybeans?

8. Sam can paddle a canoe in still water at a speed of 55 meters per minute. If he paddles upstream 135 meters in 3 minutes, what is the speed of the current?

9. Abandoned mines frequently fill with water. Before an abandoned mine can be reopened the water must be pumped out. The size of pump required depends on the depth of the mine. If pumping out a mine that is  $D$  feet deep requires a pump that pumps a minimum of  $\frac{D^2}{25} + 4D - 250$  gallons per minute, pumping out a mine that is 150 feet deep would require a pump that pumps a minimum of how many gallons per minute?

10. The length of a rectangle is 5 inches longer than the width. If the area is at most 66 square inches, what are the possible values for the width?

11. A ball is thrown upward with an initial velocity of 80 ft. per second. The distance  $h$  (in feet) of the ball from the ground after  $t$  seconds is  $h(t) = 80t - 16t^2$ . For what time,  $t$  is the ball more than 128 feet above the ground?

12. The volume  $V$ , of a right circular cylinder of height  $h$  and radius  $r$ , is  $V = \pi r^2 h$ . If the height is twice the radius, express the volume  $V$  as a function of  $r$ .

13. The volume  $V$ , of a right circular cone, is  $V = \frac{1}{3} \pi r^2 h$ . If the height is twice the radius, express the volume  $V$  as a function of  $r$ .

14. The surface area  $S$  (in square meters) of a hot-air balloon is given by  $S(r) = 4\pi r^2$  where  $r$  is the radius of the balloon (in meters). If the radius  $r$  is increasing with time  $t$  (in seconds) according to the formula  $r(t) = \frac{2}{3}t^3$ , find the surface area  $S$  of the balloon as a function of time,  $t$ .

15. The spread of oil leaking from a tanker is in the shape of a circle. If the radius  $r$  (in feet) of the spread after  $t$  hours is  $r(t) = 200\sqrt{t}$ , find the area  $A$  of the oil slick as a function of time.

16. An open box is made from a rectangular piece of cardboard measuring 12 inches by 16 inches by cutting identical squares from the corners and turning up the sides. Use interval notation to describe the possible lengths of the side of the removed squares if the volume of the open box is not to exceed 145 cubic inches.

17. Allie wants to take dance lessons at a studio over the summer. It costs a flat fee of \$50 to use the studio's facilities, then an additional \$20 for each lesson. If Allie has \$210, write and solve an inequality that describes how many lessons Allie can take within her budget.

18. Jake sold 9 used books for \$9.80 each. With the money from these sales, he bought 4 new books and had \$37.80 left over. What was the average amount Jake paid for each new book?

19. The perimeter of a parallelogram is 72 inches, and one side measures 12 inches. What are the lengths, in inches, of the other 3 sides?

20. Joseph will have a 200-foot-long fence installed around his yard. The A+ Fence Company charges a \$500.00 fee, plus a set amount per foot of fence. The A+ Fence Company has given Joseph an estimate of \$2,200.00 to install the fence around his yard. What is the set amount per foot of fence?