Variables in Real-World Problems

Name: _____	Date: _____	Score: _____ / 24

Quick Review

In real-world problems, a **variable** stands for a quantity that can change or that you don't know yet. The first step is to clearly define what your variable means — for example, "let m be the number of minutes." Then you build an **expression** that describes the situation using that variable. A fixed amount that never changes becomes a **constant**, and an amount that repeats becomes a coefficient multiplied by the variable. Writing the expression carefully lets you answer the question for *any* value later.

◇ **Example:** A gym charges a $\$20$ sign-up fee plus $\$15$ each month. Write an expression for the total cost after m months.
⇒ Let's decide what the variable means first: m is the number of months. The $\$15$ monthly fee happens once per month, so for m months that part costs $15m$ dollars. The $\$20$ sign-up fee is paid only once — it's a constant. We add the two parts together to get $15m + 20$. Now we could find the cost for any number of months just by substituting.

Answer: $15m + 20$

PRACTICE

Write an expression for each situation using the given variable.

1. Total apples if there are a bags of 6 _____
2. Cost of p pencils at 2 dollars each _____
3. Hours left in a 24-hour day after h hours _____
4. Pages read if d days of 10 pages _____
5. Total students in c classes of 25 _____
6. Money left from 50 dollars after spending s _____
7. Total wheels on b bicycles _____
8. Cost of a 5-dollar ticket plus f dollars for food _____
9. Slices of pizza each if 8 slices shared by n people _____
10. Total legs on s spiders _____
11. Earnings for h hours at 12 dollars per hour _____
12. Total cost of t shirts at 9 dollars plus 4 shipping _____
13. Candies each if 36 candies split among g groups _____
14. Distance in t hours at 55 miles per hour _____
15. Pencils left in a box of 30 after using u _____
16. Total cost of m months of streaming at 8 dollars _____
17. Total seats in r rows of 12 plus 3 extra _____
18. Width of a rectangle with area 48 and length ℓ _____
19. Total points from q questions worth 5 each _____
20. Cost of x books at 7 dollars with a 10-dollar coupon _____

♦ Word Problems

21. A landscaper charges a $\$40$ visit fee plus $\$25$ per hour. Let h be the number of hours. Write an expression for the total charge. _____

22. A school orders t trays of muffins with 24 muffins per tray. Write an expression for the total number of muffins, then find the total if $t = 5$. _____

23. A water tank holds 200 gallons and drains g gallons. Write an expression for the gallons remaining, then find the amount left if $g = 75$. _____

24. A pizza shop splits n pizzas equally among 4 tables. Write an expression for how many pizzas each table gets, then find the amount if $n = 12$. _____

Answer Keys

1. $6a$
2. $2p$
3. $24 - h$
4. $10d$
5. $25c$
6. $50 - s$
7. $2b$
8. $f + 5$
9. $\frac{8}{n}$
10. $8s$
11. $12h$
12. $9t + 4$
13. $\frac{36}{g}$
14. $55t$
15. $30 - u$
16. $8m$
17. $12r + 3$
18. $\frac{48}{\ell}$
19. $5q$
20. $7x - 10$
21. $25h + 40$
22. $24t$; 120 muffins
23. $200 - g$; 125 gallons
24. $\frac{n}{4}$; 3 pizzas

Step-by-Step Explanations

1. Each bag has 6 apples, so a bags hold $6a$ apples.
2. At 2 dollars per pencil, p pencils cost $2p$ dollars.
3. Start with 24 hours and subtract the h hours used: $24 - h$.
4. Reading 10 pages a day for d days gives $10d$ pages.
5. Each class has 25 students, so c classes have $25c$ students.
6. Begin with 50 dollars and take away s spent: $50 - s$.
7. Each bicycle has 2 wheels, so b bicycles have $2b$ wheels.
8. The ticket is a constant 5 dollars; add the food cost f: $f + 5$.
9. Sharing 8 slices equally among n people: $\frac{8}{n}$ each.
10. Each spider has 8 legs, so s spiders have $8s$ legs.
11. At 12 dollars per hour, working h hours earns $12h$ dollars.
12. The shirts cost $9t$ dollars; shipping adds a constant 4: $9t + 4$.
13. Dividing 36 candies into g equal groups: $\frac{36}{g}$ each.
14. Distance is speed times time: $55t$ miles.
15. Start with 30 pencils and subtract the u used: $30 - u$.
16. At 8 dollars per month, m months cost $8m$ dollars.
17. The rows hold $12r$ seats; add the constant 3 extra: $12r + 3$.
18. Width is area divided by length: $\frac{48}{\ell}$.
19. Each question is worth 5 points, so q questions give $5q$ points.
20. The books cost $7x$ dollars; the coupon subtracts a constant 10: $7x - 10$.
21. The hourly part is $25h$ dollars, and the $40 visit fee is a constant added once. The total is $25h + 40$.
22. Each tray has 24 muffins, so t trays give $24t$. When $t = 5$: $24 \times 5 = 120$ muffins.
23. Start with 200 gallons and subtract the g drained: $200 - g$. When $g = 75$: $200 - 75 = 125$ gallons.
24. Dividing n pizzas among 4 tables gives $\frac{n}{4}$ each. When $n = 12$: $\frac{12}{4} = 3$ pizzas per table.

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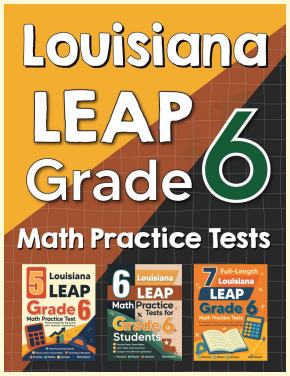

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