

Variables in Real-World Problems

Name: _____

Date: _____

Score: _____ / 24

Q 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.

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

◆ 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

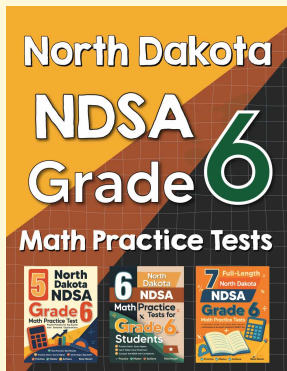
- | | |
|------------------|------------------------------|
| 1. $6a$ | 13. $\frac{36}{g}$ |
| 2. $2p$ | 14. $55t$ |
| 3. $24 - h$ | 15. $30 - u$ |
| 4. $10d$ | 16. $8m$ |
| 5. $25c$ | 17. $12r + 3$ |
| 6. $50 - s$ | 18. $\frac{48}{\ell}$ |
| 7. $2b$ | 19. $5q$ |
| 8. $f + 5$ | 20. $7x - 10$ |
| 9. $\frac{8}{n}$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

Step-by-Step Explanations

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