Name Key

Pre-AP Algebra II – Test Review Unit 2 – Equations, Inequalities, and Functions

Date_____ Pd.___

Susan makes and sells purses. The purses cost her $12 each to make, and she sells them for $25. This Saturday, she is renting a booth at a craft fair for $60. Use this information for Items 1–3.

1. Write an equation that can be used to find the number of purses Susan must sell to make a profit of $250 at the fair.

25 − 12 = 13

$250 = 13p - 60$

2. Solve the equation, and interpret the solution.

$250 = 13p - 60$
$+60 \quad +60$
$310 = 13p$
$\frac{310}{13} = \frac{13p}{13}$
$p = 23.84$

She would need to sell 24 purses to make $250

3. If Susan sells 20 purses at the fair, will she meet her profit goal? Explain why or why not.

$13(20) - 60$
$260 - 60 = 200$

She will only make $200

Jerome bought a sweater that was on sale for 20 percent off. Jerome paid $25.10 for the sweater Including sales tax of 8.25 percent. Use this Information for items 4-6.

$C(p) = .8p$

$T(C(p)) = 1p + .0825p$

$T(C(p)) = 1.0825p$

4. Write an equation that can be used to find the original price of the sweater.

$25.10 = 1.0825(.8p)$

5. Solve the equation, and interpret the solution.

$25.10 = .866p$

$28.98 = p$

The original price was $28.98.

6. How much money did Jerome save by buying the sweater on sale? Explain how you determined your answer.

$28.98 + 28.98(.0825) = 31.37$

$31.37 - 25.10 = 6.27$

Jerome saved $6.27

Solve each absolute value equation.

7. a. $|2x - 3| = 7$

$2x - 3 = 7$
$2x = 10$
$x = 5$

$2x - 3 = -7$ (+3 +3)
$2x = -4$
$x = -2$

b. $|2x + 5| = 23$

$2x + 5 = 23$
$-5 \quad -5$
$2x = 18$
$x = 9$

$2x + 5 = -23$
$-5 \quad -5$
$2x = -28$
$x = -14$

c. $|x - 10| - 11 = 12 - 23$
$+11 \quad +11$
$|x - 10| = 0$
$x - 10 = 0$
$x = 10$

d. $|7x + 1| - 7 = 3$

$|7x + 1| = 10$

$7x + 1 = 10$
$7x = 9$
$x = 9/7$

$7x + 1 = -10$
$7x = -11$
$x = -11/7$

e. $|2x| - 3 = -5$

$|2x| = -2$

No Solution

8. If the center thickness of a lens varies more than 0.150 millimeter from the target thickness of 5.000 millimeters, the lens cannot be used. Write and solve an absolute value equation to find the extreme acceptable values for the center thickness of the lens.

$|x - 5.000| = .150$

$x - 5 = .15$
$x = 5.15$

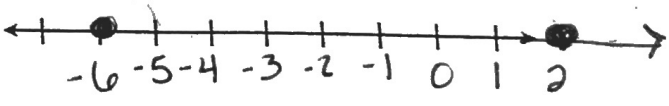
$x - 5 = -.15$
$x = 4.85$

9. Solve the equation $|2x + 4| - 1 = 7$. Then graph the solutions on a number line.

$|2x + 4| = 8$

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

$2x + 4 = -8$
$2x = -12$
$x = -6$

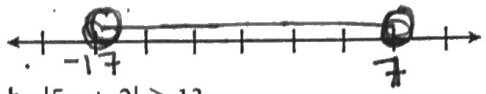


10. Solve each absolute value inequality. Graph the solutions on a number line.

a. $|x+5|<12$

$x+5<12$ $\quad x+5>-12$

$x<7$ $\quad x>-17$

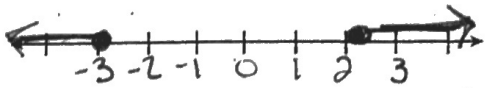



b. $|5x+2|\geq 13$

$5x+2\geq 13$ $\quad 5x+2\leq -13$

$5x\geq 11$ $\quad 5x\leq -15$

$x\geq 11/5$ $\quad x\leq -3$




c. $|10x-12|-9\leq -1$ $\quad |10x-12|\leq 8$

$10x-12\leq 8$ $\quad 10x-12\geq -8$

$10x\leq 20$ $\quad 10x\geq 4$

$x\leq 2$ $\quad x\geq 4/10=2/5$

$x\geq 2/5$

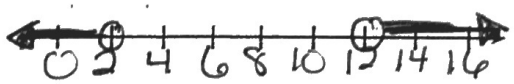

d. $|x-7|+3>8$

$-3\ -3$

$|x-7|>5$

$x-7>5$ $\quad x-7<-5$

$x>12$ $\quad x<2$




e. $|-2x+5|+6\geq 4$

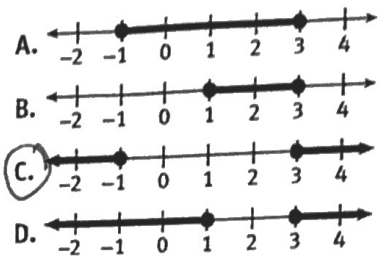
$-6\ -6$

$|-2x+5|\geq -2$

All real #s

11. Which number line shows the solutions of the inequality $2|x-1|\geq 4$?

$|x-1|\geq 2$




$x-1\geq 2$

$x\geq 3$

$x-1\leq -2$

$x\leq -1$

Jim wants to calculate the cost of running his lawn mowers. The mowers consume 2.5 gallons of gasoline each hour. Gasoline costs $3.50 per gallon.

13. Write a function $g(h)$ that gives the number of gallons $g$ that the mowers will use in $h$ hours. Identify the units of the domain and range.

$g(h)=2.5h$

Domain: hours Range: gallons

14. Write a function $c(g)$ for the cost $c$ in dollars for $g$ gallons of gasoline. Identify the units of the domain and range.

$C(g)=3.50g$

hours → gallons → cost

15. Use composition of functions to create a function for the cost $c$ in dollars of gasoline to mow $h$ hours. Identify the units of the domain and range. Then explain how the domain and range of the composite function are related to the domain and range of $g(h)$ and $c(g)$.

$C(g(h))=3.50(2.5(h))$

Domain: hours Range: Cost

16. Use the composite function in Item 15 to determine the cost of gasoline to mow 12 hours. Show your work.

$C(g(12))=3.5(2.5(12))=105$

To mow 12 hours cost $105.

17. What is the slope of the composite function, and what does it represent in this situation?

$C(g(x))=3.5(2.5(x))$

$C(g(x))=8.75x$

8.75 is the slope.

It cost $8.75 to run the mower for an hour.

Use $f(x) = x^2$, $g(x) = x + 5$, and $h(x) = 4x - 6$
Find each function and simplify the function rule.

18. $(f \circ g)(x)$ $(x+5)^2 = (x+5)(x+5)$

$x^2 + 10x + 25$

19. $(g \circ f)(x)$ $= x^2 + 5$

20. $(f \circ h)(x)$ $(4x-6)^2 = (4x-6)(4x-6)$

$16x^2 - 24x - 24x + 36$

$16x^2 - 48x + 36$

21. $(h \circ f)(x)$

$4x^2 - 6$

22. $(g \circ h)(x)$ $(4x-6) + 5$

$4x - 1$

23. $(h \circ g)(x)$ $4(x+5) - 6$

$4x + 20 - 6 = 4x + 14$

Use $f(x) = 5x + 2$ and $g(x) = 3 - x$ to answer 24-26.

24. What is the value of $f(g(-1))$ and $g(f(-1))$?

$f(g(-1)) = f(4) = 22$

$g(f(-1)) = g(-3) = 3 - -3 = 6$

25. What is the composite function $y = f(g(x))$?

$y = 5(3 - x) + 2$

$15 - 5x + 2 = 17 - 5x$

26. What is the composite function $y = g(f(x))$?

$y = 3 - (5x + 2)$

$= 3 - 5x - 2$

$= 1 - 5x$

Find the inverse of each function.

27. a. $f(x) = 2x - 10$

$x = 2y - 10$

$\frac{x + 10}{2} = y$

$f^{-1}(x) = \frac{1}{2}x + 5$

b. $g(x) = \frac{x+5}{4}$

$x = \frac{y+5}{4} \cdot 4$

$4x = y + 5$

$f^{-1}(x) = 4x - 5$

c. $h(x) = \frac{1}{6}(x - 8)$

$6x = \frac{1}{6}(y - 8) \cdot 6$

$6x = y - 8$

$+8 \quad +8$

$f^{-1}(x) = 6x + 8$

d. $j(x) = -5x + 2$

$x = -5y + 2$

$\frac{x - 2}{-5} = \frac{-5y}{-5}$

$f^{-1}(x) = -\frac{1}{5}x + \frac{2}{5}$

28. Given that $f(1) = 5$, which of the following statements must be true?

A. $f^{-1}(1) = -5$ B. $f^{-1}(1) = 5$

C. $f^{-1}(5) = -1$ D. $f^{-1}(5) = 1$

29. What is the inverse of the function $p(t) = 6t + 8$?

A. $p^{-1}(t) = -6t - 8$

B. $p^{-1}(t) = \frac{-t + 8}{6}$

C. $p^{-1}(t) = \frac{t - 8}{6}$

D. $p^{-1}(t) = \frac{1}{6}t - 8$

$x = 6y + 8$

$\frac{x - 8}{6} = \frac{6y}{6}$

$\frac{x - 8}{6} = y$

30. Use the definition of *inverse* to determine whether or not each pair of functions are inverses.

a) a. $f(x) = 5x - 3$, $g(x) = \frac{x}{5} + 3$ $5(\frac{x}{5} + 3) - 3$

$x + 15 - 3$

b. $f(x) = \frac{x}{2} + 3$, $g(x) = 2x - 6$

b) $f(g(x)) = \frac{2x - 6}{2} + 3$

$x - 3 + 3 = x$

c. $f(x) = 2(x - 4)$, $g(x) = \frac{1}{2}x + 4$

c) $f(g(x)) = 2(\frac{1}{2}x + 4 - 4)$

$2(\frac{1}{2}x) = x$

d. $f(x) = x + 3$, $g(x) = -x - 3$

d) $f(g(x)) = (-x - 3) + 3$

$f(g(x)) = -x$

31. Write the inverse of the function defined by the table shown below.

| $x$ | −2 | 0 | 1 | 3 | 5 |
|---|---|---|---|---|---|
| $f(x)$ | 4 | −1 | 2 | 0 | 5 |

| $x$ | 4 | −1 | 2 | 0 | 5 |
|---|---|---|---|---|---|
| $f^{-1}(x)$ | −2 | 0 | 1 | 3 | 5 |

$\frac{3}{4} \cdot \frac{16}{1}$

$\frac{1}{6}x + 16 = -\frac{3}{4}(x - 16)$

$\frac{1}{6}x + 16 = -\frac{3}{4}x + 12$

$-16 \qquad -16$

$\frac{2}{12}x \Leftarrow \frac{1}{6}x = -\frac{3}{4}x - 4$

$\frac{9}{12}x \Leftarrow +\frac{3}{4}x \qquad +\frac{3}{4}x$

$\cdot \frac{11}{12}x = -4$

$\frac{12}{11} \cdot \frac{11}{12}x = -4 \cdot \frac{12}{11}$

$x = -\frac{48}{11}$