

SAMPLE PROBLEMS - MIDDLE SCHOOL PRAXIS II

1. Let $S = \{W, X, Y, Z\}$ and let $\$$ be a binary operation defined on S according to the following table:

$\$$	W	X	Y	Z
W	X	Z	W	Y
X	Z	Y	X	W
Y	W	X	Y	Z
Z	Y	W	Z	X

What is the inverse of Z?

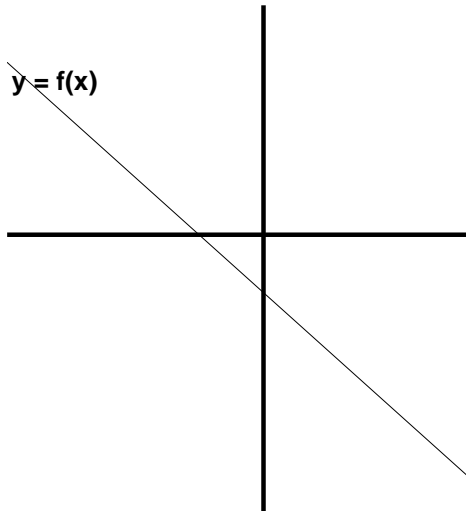
- A. W
- B. X
- C. Y
- D. Z does not have an inverse.

2. Which of the following expressions is equal to

$$\frac{(x/3) - (3/x)}{1 - (3/x)}$$

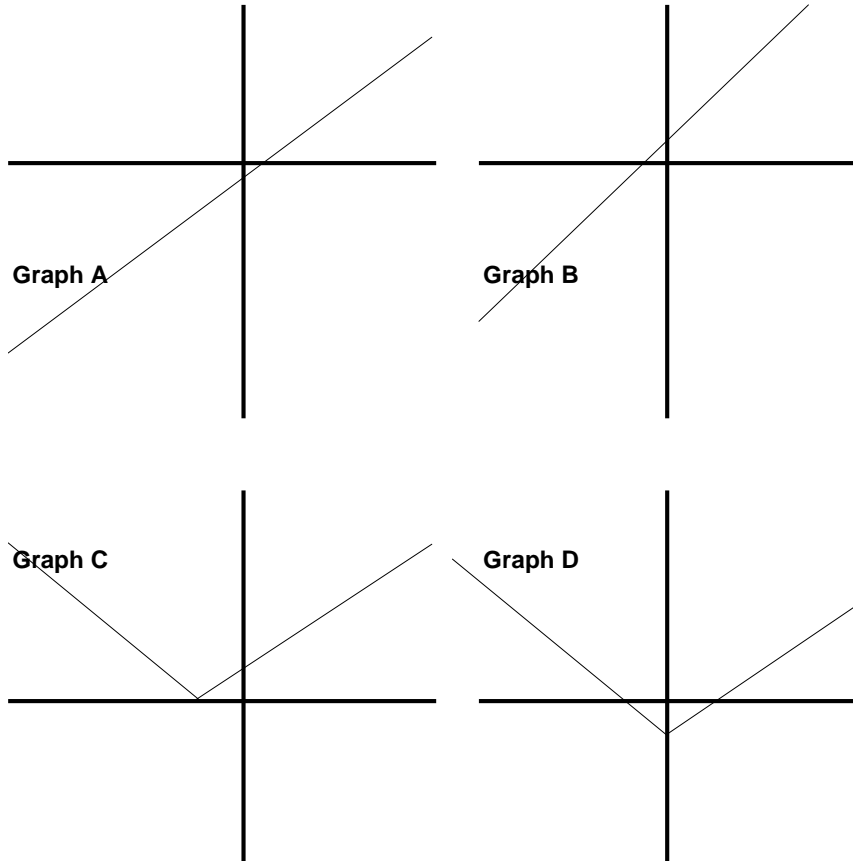
- A. $(x - 3)/3$
- B. $(x + 3)/3$
- C. $3(x - 3)$
- D. $3(x + 3)$

3. The following is a graph of $y = f(x)$:



Which of the following graphs represents $|f(x)|$?

- A. Graph A
- B. Graph B
- C. Graph C
- D. Graph D



4. Calculate $i^5 * i^6 * i^7 * i^8$.

- A. +1
- B. -1
- C. +i
- D. -i

5. Which of the following equations provides the closest fit to the following data?

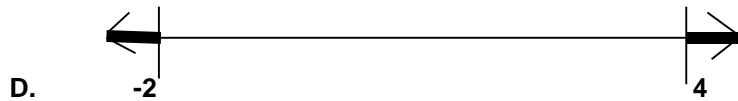
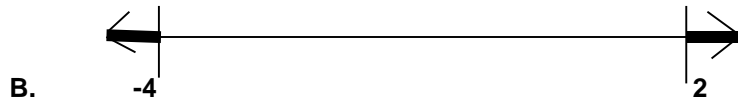
x	1	2	3	4	5
y	10	5	2.5	1.25	0.625

- A. $y = -10*(x - 1) + 10$
- B. $y = 10/x$
- C. $y = 1.25*x^2 - 8.75x + 17.5$
- D. $y = 20/2^x$

6. A homeowner puts his house up for sale at a price of \$250,000 on January 1. For each month that the house does not sell, he reduces the price 0.5%. If the house is still unsold at July 1, approximately what is the price on that date?

- A. 150,000
- B. 180,000
- C. 210,000
- D. 240,000

7. Which graph represents the solution of $|3x + 3| \geq 9$?



8. Find the volume of a pyramid having slant height 5 and a base that is a square with side 8.

- A. 64
- B. 106.67
- C. 320
- D. 576

9. Solve for x in $4^{|x+1|} + 3 = 19$

- A. +1
- B. -3 and +1
- C. -1 and +3
- D. +1 and +3

10. If a person has \$3.05 in nickels and dimes, and she has 7 more nickels than dimes, how many dimes does she have?

SUGGESTED ANSWERS

1. Answer: A.

If Z has an inverse Q, then $Z \S Q = Q \S Z =$ the identity element. So first find the identity element. By inspection it is Y, because $W \S Y = W$, $X \S Y = X$, $Y \S Y = Y$, $Z \S Y = Z$; the commutative equations also work.

(Note that values in the column under the \S are equal to the values in the column under the Y.)

Now that we know the identity element is Y, we need to find the Q such that $Z \S Q = Q \S Z = Y$. By inspection, the value that works is $Q = W$.

2. Answer: B.

$$\frac{(x/3) - (3/x)}{1 - (3/x)} = \frac{(x^2/3x) - (3 \cdot 3/3x)}{(x/x) - (3/x)} = \frac{(x^2 - 9)/3x}{(x-3)/x} = \frac{(x+3)}{3}$$

3. Answer: C.

| f(x) | \geq for all x. Only Graph C is ≥ 0 for all x.

4. Answer: B.

Recall that $i^2 = -1$, $i^3 = -i$, $i^4 = +1$, $i^5 = i$, and then the cycle begins again.

$$i^5 * i^6 * i^7 * i^8 = i * i^2 * i^3 * i^4 = i * (-1) * (-i) * (+1) = + i^2 = -1.$$

$$\text{Equivalently: } i^5 * i^6 * i^7 * i^8 = i^{26} = i^{24} * i^2 = (i^4)^6 * i^2 = (+1)^6 * (-1) = -1.$$

5. Answer: D.

If you notice that each y value is half of the prior y value, you will choose D as the only equation which does that.

Alternately: The slopes are not constant, so A. is false. All three remaining equations give $y=10$ at $x=1$, and they also give $y=5$ at $x=2$. You can continue plugging in $x=3$ and $x=4$, and it will not be until $x=4$ that only the last equation still works. Rather than plugging in $x=3$ and $x=4$, you might skip ahead and plug in $x=5$, where only the last equation still works.

6. Answer: D.

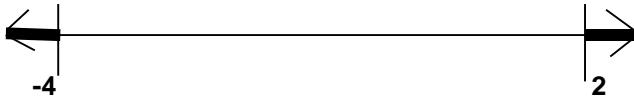
$$0.5\% = .005 \quad \text{A decrease of } 0.5\% \text{ per month requires multiplying each month by } (1-.005) = .995 \quad .250000 * (.995^6) = 242593$$

7. Answer: B.

$|3x + 3| \geq 9$ means $+(3x + 3) \geq 9$ or $-(3x + 3) \geq 9$.

$+(3x + 3) \geq 9$, $3x \geq 6$, $x \geq 2$

$-(3x + 3) \geq 9$, $-3x \geq 12$, $x \leq -4$.



8. Answer: A.

$V = (1/3)(\text{area of base})(\text{height})$. Area of base = $8 \cdot 8 = 64$.

The slant height S is the hypotenuse of a right triangle with legs $h = \text{height of pyramid}$, and $r = \text{radius of a circle inscribed in the square base}$.

$S^2 = h^2 + r^2$, $5^2 = h^2 + (8/2)^2$, $h = 3$.

$V = (1/3)(64)(3) = 64$.

9. Answer: B.

$4^{|x+1|} + 3 = 19$, $4^{|x+1|} = 16 = 4^2$, $|x + 1| = 2$,

$+(x+1) = 2$, $x = +1$; and $-(x+1) = 2$, $x = -3$.

10. Answer: 18.

Let x be the number of dimes, and $x + 17$ be the number of nickels. $(x + 7) \cdot 0.05 + x \cdot 0.10 = 3.05$, multiply both sides by 100, $5x + 35 + 10x = 305$, $15x = 270$, $x = 18$, $x + 7 = 25$. Check: $18 \cdot 0.10 + 25 \cdot 0.05 = 3.05$

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