

**Keystone Exam... Practice Test # 1**

**Part 1 -- Multiple Choice**

- C 1) Sam needs to make a long-distance call from a pay phone. With his prepaid phone card, he will be charged \$1.00 to connect and \$0.50 per minute. If he places a collect call with the operator he will be charged \$3.00 to connect and \$0.25 per minute. In how many minutes will the phone card and the collect call cost the same?

A) 5 minutes

B)  $5\frac{1}{3}$  minutes

C) 8 minutes

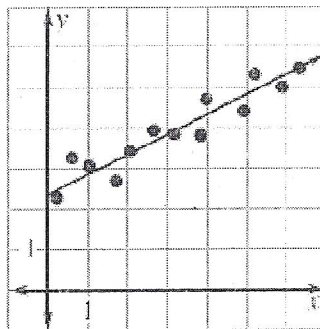
D) 16 minutes

$$\begin{aligned} 1 + .5m &= C \\ 3 + .25m &= C \end{aligned}$$

$$\begin{aligned} 1 + .5m &= 3 + .25m \\ .25m &= 2 \end{aligned}$$

$$4 \left( \frac{1}{4} m = 2 \right) \quad m = 8$$

- A 2) What is the correlation represented by the scatter plot shown?



A) Positive

B) Negative

C) None

D) Undefined

- A 3) When the expression  $x^2 - x - 12$  is factored completely, which is one of its factors?

A)  $x - 4$

$$(x - 4)(x + 3)$$

B)  $x - 6$

C)  $x + 4$

D)  $x - 3$

- B 4) Which expression has the same value as  $(2 \cdot 2^{-2})^5$ ?

A)  $2^{-10}$

B)  $2^{-5}$

C)  $2^3$

D)  $2^4$

$$(2 \cdot 2^{-2})^5 = (2^1 \cdot 2^{-2})^5 = 2^{5 \cdot -1} = 2^{-5}$$

B 5) Simplify:  $\frac{m^2 - 49}{m^2 + 5m - 14} = \frac{(m-7)(m+7)}{(m+7)(m-2)}$

A)  $-\frac{1}{7m}$

B)  $\frac{m-7}{m-2}$

C)  $\frac{m+7}{m-2}$

D)  $\frac{m-7}{m+7}$

C 6) Which value of  $x$  makes  $5\sqrt{7x}$  equivalent to  $15\sqrt{21}$ ?  $= 5 \cdot 3\sqrt{21} = 5\sqrt{21 \cdot 9} = 5\sqrt{189}$

A)  $x = 3$

B)  $x = 9$

C)  $x = 27$

D)  $x = 225$

C 7) The amount charged for each large pizza ( $p$ ) is based on the cost of a plain pizza plus an additional charge for each topping ( $t$ ). The following equation models this relationship.

$$p = 7 + 0.75t$$

What does the number 0.75 represent in the equation?

A) Number of toppings

B) Cost of a plain pizza (no toppings)

C) Additional cost for each topping

D) Cost of a pizza with one topping

C 8) A carpet cleaning company charges \$2 for every square yard of carpet cleaned plus a fee of \$42. What is an equation for the charge,  $c$ , in terms of the number of square yards,  $n$ ?

A)  $c = 2 + 40n$

B)  $n = 40 + 2c$

C)  $c = 2n + 42$

D)  $c = 42n + 2$

A 9) Factor:  $2x^3 + 8x^2 - 24x = 2x(x^2 + 4x - 12) = 2x(x+6)(x-2)$

A)  $2x(x+6)(x-2)$

B)  $2x(x-6)(x+2)$

C)  $2x(x+4)(x-3)$

D)  $2x(x-4)(x+3)$

C

- 10) The Monkey Hamburger Hut is giving away toy monkeys. They have 1,000 monkeys on hand and will give away 8 monkeys per day. The number of monkeys,  $m$ , is a function of the number of days,  $d$ , which have passed since they began giving away monkeys.

$$m = 1000 - 8d$$

What is a reasonable domain for this situation?

- A)  $d \leq 1,000$       B)  $d \geq 0$   
C)  $0 \leq d \leq 125$       D)  $d > 0$

B

- 11) What is an expression for the  $n$ th term of this sequence?

5, 8, 11, 14, 17, ...

- A)  ~~$3 + 5n$~~       B)  $2 + 3n$   
C)  ~~$3 + 2n$~~       D)  ~~$5 + 2n$~~

1<sup>st</sup> term is 5  $\rightarrow n=1$

A)  $3 + 5(1) \neq 5$

C)  $3 + 2(1) = 5$  ✓

B)  $2 + 3(1) = 5$  ✓

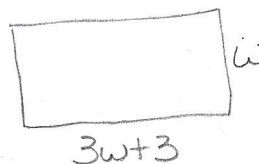
D)  $5 + 2(1) \neq 7$

2<sup>nd</sup> term is 8  $\rightarrow n=2$

C

- 12) The length of a rectangle is 3 centimeters more than 3 times the width. If the perimeter of the rectangle is 46 centimeters, find the dimensions of the rectangle.

- A) length = 5 cm ; width = 18 cm  
B) length = 13 cm ; width = 5 cm  
C) length = 18 cm ; width = 5 cm  
D) length = 13 cm ; width = 8 cm



$$\begin{aligned} 2w + 2(3w+3) &= 46 \\ 8w &= 40 \\ w &= 5 \\ 3w+3 &= 18 \end{aligned}$$

A

- 13) The optimal operating temperature of a given car engine is within  $10^\circ\text{F}$  of  $190^\circ\text{F}$ . Write an absolute value inequality for the range of acceptable temperatures and solve the inequality.

- A)  $|x - 190| \leq 10$  ;  $180 \leq x \leq 200$   
B)  $|x - 190| \geq 10$  ;  $180 \leq x \leq 200$   
C)  $|x - 190| \leq 10$  ;  $x \leq 180$  or  $x \geq 200$   
D)  $|x - 190| \geq 10$  ;  $x \leq 180$  or  $x \geq 200$

B

- 14) The cheerleaders sold spirit badges for \$5 and ribbons for \$2. Each cheerleader was required to sell 20 items. Mandy collected \$76 for 20 items but lost the envelope showing how many of each item she sold. If  $b$  represents the number of badges and  $r$  represents the number of ribbons, what system of equations should she use to determine how many spirit badges and how many ribbons she sold?

A)  $b + r = 76$   
 $5b + 2r = 20$

B)  $b + r = 20$   
 $5b + 2r = 76$

$b + r = 20$   
 $5b + 2r = 76$

C)  $b + r = 20$   
 $2b + 5r = 76$

D)  $b - r = 76$   
 $5b + 2r = 20$

D

- 15) The table below shows the cost of a ski rental package for a given number of people.

People	Cost (\$)
4	160
5	200
6	240
7	280

$m = \frac{\Delta y}{\Delta x} = \frac{200 - 160}{5 - 4} = 40$

Find the rate of change and explain what the rate of change means for this situation.

A)  $\frac{1}{280}$  dollars per person ; the cost is \$1 for 280 people

B)  $\frac{160}{1}$  dollars per person ; the cost is \$160 for each person

C)  $\frac{1}{40}$  dollars per person ; the cost is \$40 for each person

D)  $\frac{40}{1}$  dollars per person ; the cost is \$40 for each person

C

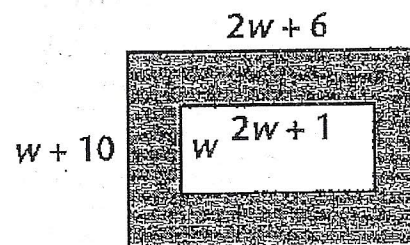
- 16) A swimming pool is surrounded by a deck as shown in the diagram. The width of the swimming pool is represented by  $w$ . Which is an expression for the area of the deck?

A)  $34w + 60$

B)  $18w + 60$

C)  $25w + 60$

D)  $4w^2 + 34w + 60$



area of deck = Area of Lg Rect - Area of Small Rect  
 $= (w+10)(2w+6) - (w)(2w+1)$   
 $= 2w^2 + 26w + 60 - 2w^2 - w = 25w + 60$

D

17) What are solutions of the inequality?

$$q + 12 - 2(q - 22) > 0$$

$$\begin{aligned} q + 12 - 2q + 44 &> 0 \\ -q + 56 &> 0 \\ 56 &> q \end{aligned}$$

A)  $q < -32$

B)  $q > -32$

C)  $q > 56$

D)  $q < 56$

C

18) Write an equation for the line that is parallel to the line  $-5x + y = 8$  and passes through the point  $(2, 16)$ .

$$\begin{aligned} y &= 5x + 8 \\ m &= 5 \\ (2, 16) &\} \quad y - 16 = 5(x - 2) \\ &\quad y = 5x + 6 \end{aligned}$$

A)  $y = 5x - 78$

B)  $y = -\frac{1}{5}x - 6$

C)  $y = 5x + 6$

D)  $y = \frac{1}{5}x + 6$

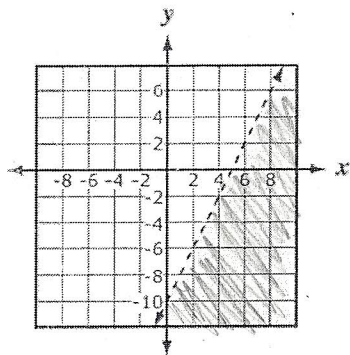
B

19) Which graph best represents  $2x - y < 10$ ?

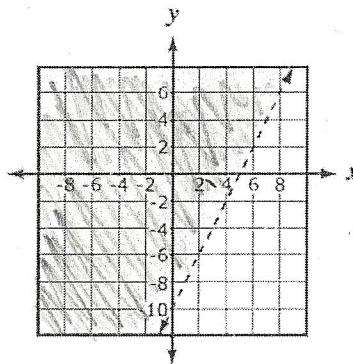
$$2x - 10 < y$$

$$y > 2x - 10$$

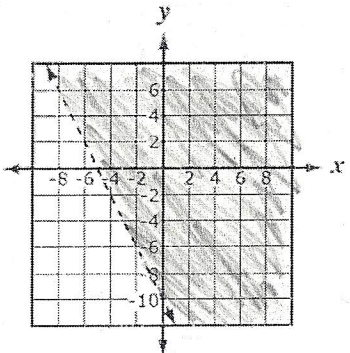
A)



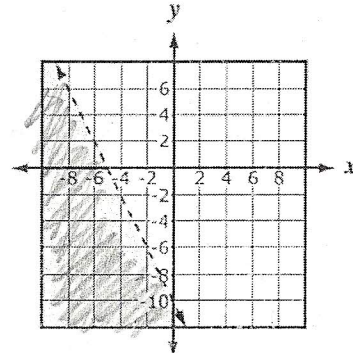
B)



C)



D)





C

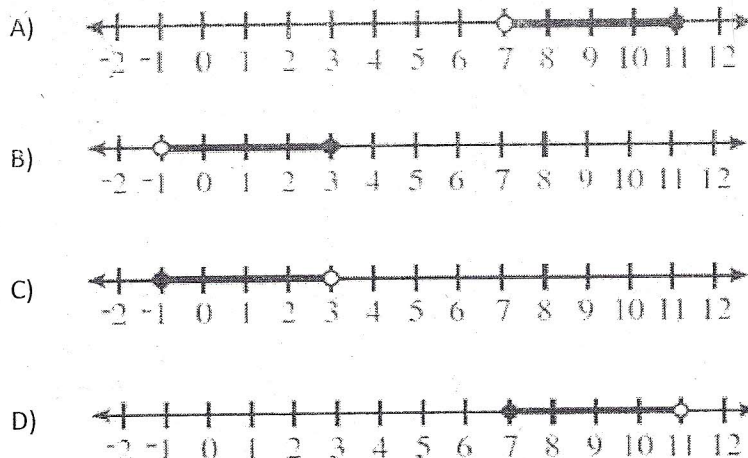
20) Which graph shows the solution to the inequality shown below?

$$15 \leq 7n - 2(n - 10) < 35$$

$$15 \leq 7n - 2n + 20 < 35$$

$$-5 \leq 5n < 15$$

$$-1 \leq n < 3$$



A

21) There are 5 blue, 3 green, and 7 red plastic chips in a box. What is the probability of randomly drawing, without replacement, a green chip and then a red chip from the box?

A)  $\frac{1}{10}$

B)  $\frac{2}{15}$

C)  $\frac{2}{3}$

D)  $\frac{7}{10}$

$P(G)$  and  $P(R/G)$

$P(G) \cdot P(R/G) =$

$\frac{3}{15} \cdot \frac{7}{14} = \frac{1}{5} \cdot \frac{1}{2} = \frac{1}{10}$

B

22) The number of students buying lunch in the cafeteria during the last 2 weeks of school is shown below.

### Students Buying Lunch

8	0	9
9	6	
10	5	5
12	3	8
13	7	8

Key
3   4 = 34

$105 \mid 123$

$med = \frac{105 + 123}{2} = 114$

What is the median number of students buying lunch?

A) 105

B) 114

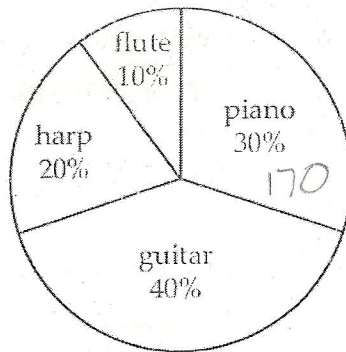
C) 113

D) 138

D

- 23) The band director surveyed students about their favorite musical instruments. The results are shown below.

Favorite Musical Instrument



$$\begin{aligned} 30\% \text{ of } x &= 170 \\ .3x &= 170 \\ x &= 566.\bar{6} \end{aligned}$$

It is estimated that about 170 students chose the piano as their favorite musical instrument. Based on these results, about how many students did the director survey?

- A) 30                      B) 170  
C) 51                      D) 567

Part 2 -- Constructed Response

- 24) A boat takes 6.5 hours to make a 70-mile trip upstream and 5 hours on the 70-mile return trip. Let  $v$  be the speed of the boat in still water, and  $c$  be the speed of the current. The upstream speed of the boat is  $v - c$  and the downstream boat speed is  $v + c$ .

- A) Write two equations, one for the upstream part of the trip and one for the downstream part of the trip. (Hint: Use the distance formula  $d = r \cdot t$ )

Upstream:  $70 = (v - c)6.5$

Downstream:  $70 = (v + c)5$

- B) Solve the equations in part A for the speed of the current. Round your answer to the nearest tenth of a mile per hour. Show your work.

$$70 = 6.5v - 6.5c \quad 70 = 5v + 5c$$

substitution method:  $\frac{70 - 5c}{5} = \frac{5v}{5}$

Let  $\boxed{14 - c} = v$

$$70 = 6.5(14 - c) - 6.5c$$

$$70 = 91 - 6.5c - 6.5c$$

$$-21 = -13c$$

$$1.6 \approx \frac{21}{13} = c$$

Current:  $1.6 \text{ m/hr}$

- C) How long would it take the boat to travel the 70 miles if there were no current? Round your answer to the nearest tenth of an hour. Show your work.

Given  $c = 1.6 \text{ m/hr}$  calculate  $v$  using the downstream equation  $14 - c = v$   
 $14 - 1.6 = v$   
 $12.4 \text{ m/hr} = v$

If  $d = 70 \text{ m}$  and  $v = 12.4 \text{ mi/hr}$  and  $c = 0$  then

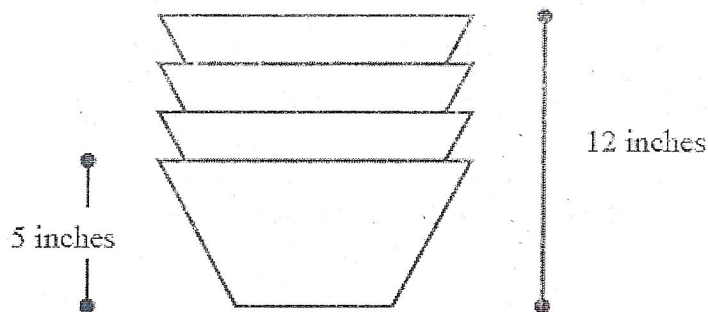
$$70 = (12.4 - 0)t$$

Time:  $5.6 \text{ hr}$

$$5.6 \text{ hr} \approx \frac{70}{12.4} = t$$



- 25) The height of one cup is 5 inches. The height of 4 stacked cups is 12 inches.



- A) Write an equation using  $x$  and  $y$  to find the height of a stack based on any number of cups.

$x = \# \text{ of cups stacked in the base cup}$      $y = \text{total height}$

$$y = \frac{12-5}{3}x + 5$$

Equation:  $y = \frac{7}{3}x + 5$

- B) Describe what the  $x$  and the  $y$  variables represent.

Variable  $x$ : # of cups stacked inside the base cup.

Variable  $y$ : total height of stack

- C) What is the height in inches of a stack of 12 cups?

$x = 11$  (1 cup is the base cup)

$y = \text{height}$

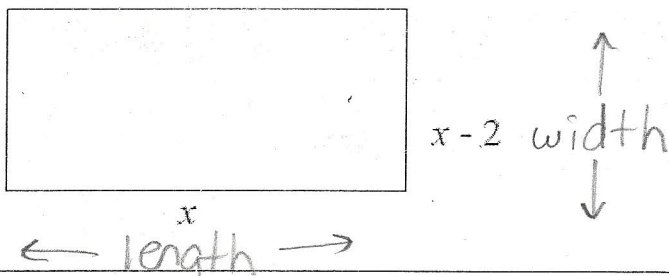
$$y = \frac{7}{3}(11) + 5$$

$$y = \frac{77}{3} + 5$$

$$y = 25\frac{2}{3} + 5 = 30\frac{2}{3}$$

Height:  $30\frac{2}{3}$  inches.

- 26) Shawn creates a rectangular garden with a width that is 2 feet shorter than its length, as shown below.



- A) Write a polynomial expression, in simplified form, that represents the area of the garden.

$$A(x) = x(x-2)$$

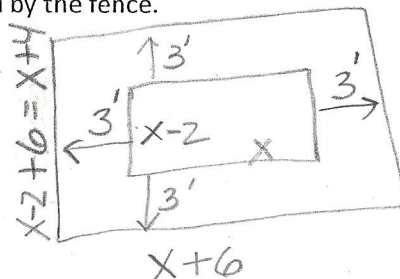
Area:  $x^2 - 2x$

- B) Shawn adds a fence 3 feet from the edges of the garden. Write a polynomial expression, in simplified form, that represents the total area enclosed by the fence.

$$(x+4)(x+6)$$

$$x^2 + 6x + 4x + 24$$

$$x^2 + 10x + 24$$



Area:  $x^2 + 10x + 24$

- C) Shawn is unhappy with his fence, so he decides to put a fence with a different distance from the garden around the garden. The total area of the new fence and garden is  $x^2 + 6x + 8$ . Determine the new distance. Show all work. Explain why you did each step.

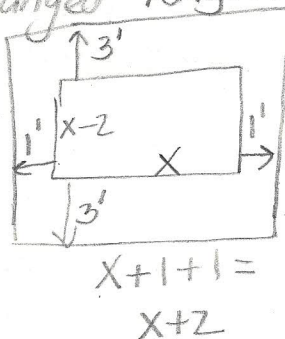
Explanation: Factor the equation to find the length and width.  $x^2 + 6x + 8 = (x+4)(x+2)$

$x+4$  is the original width not changed

$x+2$  is the new length where  $x$  is the garden with 1 foot added to each side.

width is new not changed length

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



New Distance:  $x+2$

- 27) The results of an experiment were listed in several numerical forms as listed below.

$$5^{-3} \quad \frac{4}{7} \quad \sqrt{5} \quad \frac{3}{8} \quad 0.003$$

- A) Order the numbers from least to greatest.

$$\underline{.003} \quad \underline{\frac{1}{125}} \quad \underline{\frac{3}{8}} \quad \underline{\frac{4}{7}} \quad \underline{\sqrt{5}}$$

$$\frac{1}{125} \quad \frac{4}{7} \quad \sqrt{5} \quad \frac{3}{8} \quad .003$$

$$.003 \quad .5714 \quad 2.236 \quad .375 \quad .003$$

$$.003 \quad \frac{1}{125} \quad \frac{3}{8} \quad \frac{4}{7} \quad \sqrt{5}$$

Another experiment required evaluating the expression shown below.

$$\frac{1}{6}(\sqrt{36} \div 3^{-2}) + 4^3 \div |-8|$$

- B) What is the value of the expression?

$$\frac{1}{6}(6 \div \frac{1}{9}) + 64 \div 8$$

$$\frac{1}{6}(6 \cdot 9) + 8$$

$$\frac{1}{6}(54) + 8$$

$$9 + 8$$

Value: 17

The last experiment required simplifying  $7\sqrt{425}$ . The steps taken are shown below.

$$7\sqrt{425}$$

Step 1:

$$\cancel{7(\sqrt{400} + \sqrt{25})}$$

Step 2:

$$7(20 + 5)$$

Step 3:

$$7(25)$$

Step 4:

$$175$$

One of the steps shown is incorrect.

C) Rewrite the incorrect step so that is correct.

$$\text{Step 1: } 7(\sqrt{400} + \sqrt{25}) \neq 7\sqrt{425}$$

$$7(\sqrt{400} + \sqrt{25}) \neq \sqrt{425}$$

$$7(20 + 5) \neq$$

$$25 \neq 20.615$$

Correction: Step 1:  $7(\sqrt{25 \cdot 17}) = 7(\sqrt{25} \cdot \sqrt{17})$

D) Using the corrected step from part C, simplify  $7\sqrt{425}$ .

$$\begin{aligned} 7\sqrt{425} &= 7(\sqrt{25 \cdot 17}) \\ &= 7(\sqrt{25} \cdot \sqrt{17}) \\ &= 7(5 \cdot \sqrt{17}) \\ &= 35\sqrt{17} \end{aligned}$$

Simplified Answer:  $35\sqrt{17}$