Core Academic Skills for Educators: Mathematics (5732)

Practice Test: Version B

* Developed by the VCSU Fall 2018 Math 491 Capstone Course

SOLUTIONS with RATIONALE and RELATED ND MATH STANDARDS
Taking the Practice Test

Actual Time Allowed on Test Day: 85 minutes

Number of Questions: 56

Format: Multiple Choice, Multiple Answer, and Numeric Entry

Calculator: When taking the actual test an online four-function calculator (i.e. add, subtract, multiply, divide) is available. For this practice test you are encouraged to use your own four-function calculator.
The correct answer is: **A**

Rationale for correct answer: There is 1000 units in the y value for every 1 units in the x value. If y is represented by meters, there would be one kilometer in 1000 meters.

Related ND Math Standards: 7.RP.2, 8.EE.5, 6.EE.9
Which of the following function $f$ is being displayed?

A. $3y = -9x + 12$
B. $y = 4x - 3$
C. $y = 9x - 12$
D. $y = -4x + 3$

The correct answer is: $3y = -9x + 12$

Rationale for correct answer: $y = mx + b$
The first thing to do is to find the slope, which is $(-6)/2 = -3$.
The only function that demonstrates $-3$ as the slope is $3y = -9x + 12$.
$3y = -9x + 12 \Rightarrow y = -3x + 4$

Related ND Math Standards: 8.EE.5  8.F.1  8.F.3  8.F.4  HS.ACED.1*  HS.FIF.4*
Imagine you are filling up your car with gas and the gas is coming out at a rate of 2.5 gallons per 45 seconds. At this rate, how much gas will be in your car after 2 minutes and 15 seconds?

A) 2 gallons
B) 7 gallons
C) 7.5 gallons
D) 10 gallons
E) 6.5 gallons

The correct answer is: C
Rationale for correct answer:
2 minutes and 15 seconds equals 135 seconds. 135 divided by 45 equals 3. 3 times 2.5 equals 7.5

Related ND Math Standards: 7.EE.3
Using the image below, which of the following statements are true? Mark all that apply.

A) $a = 80^\circ$
B) $x = y$
C) $c = 100^\circ$
D) $b = c$

The correct answer is: B and C

Rationale for correct answer:
A is incorrect because two parallel lines cut by a transversal results in corresponding angles. So angle a's supplementary angle is 110 degrees, resulting in angle a being 70 degrees.
B is correct because x and y are vertical angles. C is correct because angle a is 70 degrees, meaning angle x is $180 - 70 - 30 = 80$ degrees. Angles x and c form a line which means they add up to 180 degrees, resulting in $180 - 80 = 100 = c$. D is incorrect because we know that c is 100 degrees and b is 110 degrees due to vertical angles.

The following graph represents the amount of fish Ben has caught. If the relationship between time and fish caught remains constant, how many fish will Ben catch is 5 hours?

A) 6  
B) 8  
C) 10  
D) 15  
E) None of these

The correct answer is: D

Rationale for correct answer:
Write the equation of the line in the form of $y=mx+b$. Since the line goes through the origin, the $y$-intercept ($b$) is 0. Next, find the slope. Since the line goes through the origin, the slope ($m$) will equal $y/x$. Use the point (1,3). Slope ($m$) = $y/x = 3/1 = 3$. Now use these values to create the equation of the line. $y = 3x$. Plug 5 in for $x$ to get the answer of 15 fish.

Related ND Math Standards: 7.RP.2, 8.EE.5, HS.FIF.6*, MP1, MP4, MP7
Which of the following are statistical questions? (A statistical question is one that can be answered by collecting data and where there will be variability in that data.)

A) What proportion of the students at your school like watermelons?
B) Do you like watermelons?
C) How many bricks are in this wall?
D) What was the temperature at noon today at City Hall?
E) None are stats questions

The correct answer is: A
Rationale for correct answer: A) Statistical. This question would be answered by collecting data, and there would be variability in that data.
B) Not statistical. This question is answered by a single response. It is not answered by collecting data that vary.
C) Not statistical. This question would be answered by counting the bricks. This produces a single number. This question is not answered by collecting data that vary.
D) Non-statistical (there is one temperature).

Related ND Math Standards: 7.SP.1
The partially completed bar graph to the right shows the surface area of Australia’s climates, except for Urban. The total surface area of the four climates is approximately 7,692,000 million km squared. If the bar representing surface area, in millions of square kilometers, of urban climate is drawn it should end at approximately

A) 120,000 Thousand  
B) 1.341 Million  
C) 8.892 million  
D) 3.609 million  
E) 2.555 million

The correct answer is: A
Rationale for correct answer: Just under 3.5 mil for Arid + Just under 2.5 for Grassland + about 1.7 for tropical = 7.5ish million. When subtracted from 7,692,000 is the only answer in the right area is thousands.

Related ND Math Standards: S.ID.1, 2, 3
Write in the text box what is the correct way in writing the following expression:

One-half of nine more than two times a number \(n\)

A: \(2(2n+9)\)

B: \((2n-9)/2\)

C: \((2n+9)/2\)

D: \((9-2n)/2\)

The correct answer is: C

Rationale for correct answer: two times a number \(n\) is modeled by \(2n\), than 9 more than two times a number is \(2n-9\). Then half of nine more than two times a number is equal to the expression shown in letter C

Related ND Math Standards: HS.F.BF.2* MP(1,2,4,7)
Wally has $2,200 budgeted for the month. According to his budget shown at the right, approximately how much will he spend on gas?

A) $726  
B) $440  
C) $367  
D) $275  
E) $550

The correct answer is: E
Rationale for correct answer: Gas is approximately 25% of the pie chart. 25\% = (.25). Therefore, $2,200 \times (.25) = $550.

Related ND Math Standards: 6.RP.3, 7.RP.3, MP1, MP6
Wally is fixing up his house and has a flooring project to complete. He wants to buy enough bamboo flooring to cover the floor space in rooms A and C, as well as hallway B. How many square feet does Wally need to buy?

The correct answer is: 256 square feet
Rationale for correct answer: Students should add up all the little lengths in order to find the area of each rectangle.

Room A: 15 x 10 = 150
Hallway B: 3 x 14 = 42
Room C: 8 x 8 = 64

150 + 42 + 64 = 256

Related ND Math Standards: 3.MD.7 (d.); MP 2, MP 4
Yesterday, Jasmine bought a bag of pretzels to share with her friends. However, by the time she got home from the store she had eaten \( \frac{3}{4} \) of the pretzels. As she was putting the groceries away, she ate \( \frac{1}{2} \) of what was left. There are now 6 pretzels left in the bag. How many pretzels were in the bag to begin with?

A. 18  
B. 12  
C. 14  
D. 10  
E. 16

The correct answer is: E
Rationale for correct answer: Jasmine had 6 pretzels left after eating half of what was remaining. So there was 12 before she ate \( \frac{3}{4} \) of the pretzels. Therefore, 12 is \( \frac{3}{4} \) of how many she started with. So 12 divided by \( \frac{3}{4} \) which is 12 x 4/3 which equals 16.

Related ND Math Standards: 3.NF.3, 5.NF.6
The scatterplot suggests a correlation between variables $x$ and $y$. Which of the following best describes this correlation?

A. Positive correlation
B. Negative correlation
C. Decreasing correlation
D. There is no correlation.

The correct answer is: Negative correlation

Rationale for correct answer: This graph is showing the points descending from left to right within a reasonable form. This data is showing a relationship between two variables that move in opposite directions, creating the negative correlation. As elevation increases, mean annual temp decreases so the relationship is opposite.

Related ND Math Standards: 8.SP.1 8.SP.2  HS.SID.6  HS.SID.7*  HS.SID.8*
Question 13

Look at the pictograph, each box equals 3 boxes sold. How many boxes were sold on Monday and Wednesday?

A) 20 boxes
B) 21 boxes
C) 7 boxes
D) 10 boxes
E) 18 boxes

The correct answer is: E
Rationale for correct answer: $6 \times 3 = 18$

Related ND Math Standards:
Two of the lights at the local stadium are flickering. They both just flickered at the same time. One of the lights flickers every 7 seconds and the other light flickers every 8 seconds. How many seconds until both lights will flicker at the same time again?

A) 24 seconds  
B) 48 seconds  
C) 56 seconds  
D) 112 seconds

The correct answer is: C
Rationale for correct answer: To answer this problem you can either use a chart to mark off each time the light flickers or use the LCM of 7 and 8. \(7 \times 8 = 56\) and there are no other smaller numbers that are divisible by both 8 and 7. 112 seconds is divisible by 7 and 8, but 56 seconds happens sooner.

Related ND Math Standards: 4.MD.1, 6.NS.4, MP.3, MP.4
The two cylinders below can hold the same amount of water. Find the value of x.

A) x = 6
B) x = 8
C) x = 10
D) x = 14
E) x = 16

The correct answer is: B

Rationale for correct answer:
Volume of a cylinder = \( \pi \times \text{radius}^2 \times \text{height} \). Since these two cylinders have the same volume, they can be set equal and then solve for x. **Make sure to use radius, not diameter**

\[
\pi \times (2)^2 \times 8 = \pi \times r^2 \times (2)
\]

\[
32 = 2 \times r^2
\]

\[
16 = r^2
\]

\[
4 = r \quad \rightarrow \quad 8 = \text{diameter}
\]
Put the following numbers in order from smallest to largest:
\( \sqrt{25}, 4, \sqrt{17}, \sqrt{10}, 5.1, 12, 3 \)

A) \( \sqrt{10}, \sqrt{17}, \sqrt{25}, 3, 4, 5.1, 12 \)
B) \( 3, \sqrt{10}, 4, \sqrt{17}, \sqrt{25}, 5.1, 12 \)
C) \( 3, \sqrt{10}, \sqrt{17}, 4, \sqrt{25}, 5.1, 12 \)
D) \( 3, 4, 5.1, 12, \sqrt{17}, \sqrt{10}, \sqrt{25} \)

The correct answer is: B
Rationale for correct answer: In other from, B is, 3, 3.16, 4, 4.12, 5, 5.1, 12

Related ND Math Standards: 8.NS.2
The scatterplot above suggests a trend between variables x and y. Which of the following best describes this trend?

A) As X increases, Y decreases
B) Both X and Y remain constant
C) No correlation
D) As X increases, Y remains negative
E) As X increases, Y increases

The correct answer is: C
Rationale for correct answer: There is no correlation between the points on this graph.

Related ND Math Standards: S.ID.7, 8, 9
You decide to take a trip, you are flying from one time zone to another: right now where you are at which is City X it is currently 1:00 PM. You decide to take a flight that is 5 hours and when you land in City Y, It is 2:00 PM. If it is noon in City X, what time is it in City Y?

The correct answer is: 8:00 AM

Rationale for correct answer: You are taking a 5-hour flight in which when you land in City Y, it is 2:00 PM. City X at this time would be 5 hours after 1:00 PM which is 6:00 PM. This shows that City X is 4 hours ahead of City Y. So when it is noon in City X, it is 8:00 AM in City Y.

Related ND Math Standards: HS.F-BF.2*, MP 1,4,6, 7
Alfred is making Super Juice for the county fair that is made from apple, pineapple, pomegranate, and grape juice. It is made with the following parts:
1/2 apple juice
1/4 pineapple juice
1/8 pomegranate juice
1/8 grape juice

If Alfred uses 1 gallon of apple juice to make Super Juice, which of the following must also be true?

A) Alfred uses 1/4 gallon of pineapple juice.
B) Alfred uses 1/2 gallon of pomegranate juice.
C) Alfred uses 1 gallon of pineapple juice.
D) Alfred uses 1/4 gallon of grape juice.
E) Alfred uses 1/16 gallon of pomegranate juice.

The correct answer is: D
Rationale for correct answer: If there is 1 gallon of apple juice, then you can use proportions to figure out that the recipe for apple juice changed from 1/2 -> 1. That means the constant of proportionality (1=.5x) is 2. Grape juice is 1/8 part so y=2*(1/8).

Related ND Math Standards: 6.EE.9, 7.RP.2, MP1, MP2, MP7
The number of absences in Mrs. Klein's class for each of the first 3 months of the year were 16, 12, and 17, respectively. If the average (arithmetic mean) number of absences for the first 4 months of the year was 14, how many absences were there in the 4th month?

A.) 9  
B.) 10  
C.) 11  
D.) 12  
E.) 13

The correct answer is: C

Rationale for correct answer:

**Strategy 1:** For the average of a set of data, the sum of the data entries is equal to the product of the average and the number of entries. Since, Average = Sum of data entries / Total number of entries, then the Sum of data entries = Average x Total # of entries. Since the average of the absences for the first 4 months is 14, the number of absences for the first 4 months is 14 x 4 = 56. The number of absences in the first 4 months minus the number of absences in the first 3 months, or 56 - (16 + 12 + 17) = 11. The answer is therefore, C.

**Strategy 2:** Let x denote the number of absences in the 4th month, the equation from above becomes: 14 = (16 + 12 + 17 + x) / 4; this is equivalent to 14 x 4 = 45 + x; simplified, x = 11.

Related ND Math Standards: (+)HS.SMD.2*; 6.SP.3, MP 6, MP 8
The cup was filled at a constant rate. It started empty. After 2 seconds, it held 70 cm cubed of water. What is the percent of the cup that is filled with water after 3 seconds?

(The Volume $V$ of a cone with base radius $r$ and height $h$ is $V = \frac{1}{3}\pi(r^2)h$.)

A. 50%  
B. 60%  
C. 67%  
D. 80%  
E. 90%

The correct answer is: E

Rationale for correct answer: First find the volume with the dimensions of the cup. The volume equals $\frac{1}{3}\pi(4^2)*7$. This equals approximately 117.23 cm cubed. Then, find the rate at which the water is filling in the cup. We know there was 70 cm cubed after 2 seconds, so that means the rate the cup is filling is 35 cm cubed per second. Using this, take 35 times 3 to see how much water will be in the cup after 35 seconds. Next, take the amount of water in the cup divided by the total volume of the cup to get the percent of the cup filled. This would take 105 divided by 117.23, which gives us .90. This as a percentage is 90%

Related ND Math Standards: 8.G.C.9, HSG.GMD.A.3, HSG.MG.A.1
Question 22

The circular region is divided into five sectors. Four of the sectors are labeled with the fraction of the area of the circular region they represent. What fraction of the area of the circular region is missing?

A. 1/4
B. 3/16
C. 1/6
D. 2/5

The correct answer is: 3/16
Rationale for correct answer:
First add all the sides up, \((1/4 + 1/16 + 1/16 + 7/16) = 13/16\)
Then subtract that by 1, 1 - 13/16 = 3/16

Related ND Math Standards: 5.NF.1  5.NF.2  5.NF.6  7.G.4
Carter went to a shopping mall and stopped at a store and bought Strawberry juice and Blueberry juice. The equation $2.4S+2.25B$ represents the total cost of the juice and amount of juice with S being strawberry and B being blueberry. What part of the equations shows the total cost of the blueberry juices he bought?

A) $2.45S$
B) $2.45S+2.25B$
C) B
D) $2.25B$
E) S

The correct answer is: D

Rationale for correct answer: B stand for blueberry and 2.25 is the price for one so $2.25B$ equals the total cost of all the blueberry juice he bought.

Related ND Math Standards: 7.EE.4, 8.EE.8
Using the bar graph below find out on average how many pizza slices did one person eat?

A) 2.8 slices
B) 3.5 slices
C) 2.5 slices
D) 3.75 slices

The correct answer is: A

Rationale for correct answer: To find the average you have to add up all of the slices eaten and divide that by the number of people who ate pizza. So $4+6+2+10 = 22$ people ate.

$4(1) + 2(6) + 3(2) + 4(10) = 62$ slices of pizza were eaten. $62/22 = 2.8181$, so 2.81 slices on average were eaten by 1 person.

Related ND Math Standards: 7.SP.2, 6.SP.5
What is the midpoint of the coordinates (3,4) and (7,12)?

A) (10,16)
B) (7,8)
C) (5,8)
D) None of these

The correct answer is: C

Rationale for correct answer:

The midpoint of two coordinates is the following:

\[
\left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)
\]

\((3+7)/2, (4+12)/2) = (10/2, 16/2) = (5,8)\)

Related ND Math Standards: HS.GGPE.6, MP 1, MP4, MP 6
What is the equation of this straight line in Slope-intercept Form?
A) \( y = -\frac{4}{3}x + \frac{2}{3} \)
B) \( y = -\frac{4}{3}x + \frac{32}{3} \)
C) \( y = \frac{4}{3}x + \frac{2}{3} \)
D) \( y - 6 = -\frac{4}{3}(x - (-4)) \)
E) No correct Answers

The correct answer is: A
Rationale for correct answer: \( m = \frac{\text{Rise}}{\text{Run}} = \frac{-8}{6} = -\frac{4}{3} \)
Next use the formula \( y - y_1 = m(x - x_1) \)
Substitute \( x_1 = -4, y_1 = 6 \) and \( m = -\frac{4}{3} \)
\[ \Rightarrow y - 6 = -\frac{4}{3}(x - (-4)) \Rightarrow y - 6 = -\frac{4}{3}(x + 4) \Rightarrow y - 6 = -\frac{4}{3}x + 16/3 \Rightarrow y = -\frac{4}{3}x - 16/3 + 6 \Rightarrow y = -\frac{4}{3}x + \frac{18}{3} \Rightarrow y = -\frac{4}{3}x + \frac{2}{3} \]

Related ND Math Standards: 8.EE.5
The distribution of students' age in Ms. Benscoter's class of 22 students is shown in the table above. If one of the students is to be randomly selected from the ages 12 and 14-year-olds, what is the probability that a 12-year-old was selected?

A) $\frac{3}{10}$  
B) $\frac{2}{3}$  
C) $\frac{5}{10}$  
D) $\frac{1}{5}$  
E) $\frac{1}{3}$

The correct answer is: D

Rationale for correct answer: There are 5 12-year-olds and 10 14-year-olds which means the odds of picking a 12-year-old is $\frac{5}{15}$ which can be reduced to $\frac{1}{3}$.

Related ND Math Standards: S.CP.6, 7, 8, 9
You are making a design with the 3 primary colors. red, yellow, and blue. This design features 3 blue squares for every 2 yellow squares, and 5 red squares for every 6 blue squares. If this design has 4 yellow squares in it, how many red squares are in it?

Red Squares: __________

The correct answer is: 5
Rationale for correct answer: The design has 4 yellow squares. But the given information states for every 2 yellow squares, you have 3 blue squares. But in this case, we have 4 yellow squares which means we have 6 blue squares. And stated, 5 red squares occur for each 6 blue squares. And since we have 6 blue squares this means we have 5 red squares so the answer is 5.

Related ND Math Standards: HS.AREI.1 MP: 1,6,7
Lucinda's hair is 4 centimeters long. Her hair grows 1.5 centimeters per month. Lucinda wants her hair to grow so that it is at least 7 centimeters long. In months, how long will it take for Lucinda's hair to grow to at least 7 centimeters long?

A) 1
B) 1.5
C) 3
D) 4
E) 2

The correct answer is: E
Rationale for correct answer: Given the information, you set up the inequality $1.5x + 4 \geq 7$ with $x$ being the number of months. Solve for $x$. $1.5x \geq 3; x \geq 2$. Since the inequality is less than or equal to, the answer is E.

Related ND Math Standards: 7.EE.4, HS.A.REI.3, MP1, MP6, MP8
Question 30

The accompanying histogram shows the heights of the students in Kyra's health class.

What is the total number of students in the class?

The correct answer is: 16
Rationale for correct answer: The bars line up to the number of times that height occurs in Kyra's class. To find the answer, add up 2 + 4 + 5 + 4 + 1. That equals to 16.

Related ND Math Standards: 6.SP.4; HS.SID.1*; MP 6, MP 1
Of the following fractions, which is the greatest?

A. 7/13  
B. 3/5  
C. 5/8  
D. 8/9  
E. 11/16

The correct answer is: D

Rationale for correct answer: Dividing the numerator by the denominator and rounding two decimal places gives us:
A = 0.54  
B = 0.6  
C = 0.63  
D = 0.89  
E = 0.69

Related ND Math Standards: 4.NF.2
Question 32

4 – 3[4 – 2(6 – 3)] ÷ 2

Which of the following would be a logical and correct first step in solving the equation above?

A. 1[4 – 2(6 – 3)] ÷ 2

B. 4 – 3[4 – 2(3)] ÷ 2

C. 4 – 3[-2] ÷ 2

D. 4 – 3[4 – 6] ÷ 2

The correct answer is: 4 – 3[4 – 2(3)] ÷ 2

Rationale for correct answer:

4 – 3[4 – 2(3)] ÷ 2 this is the first step because parentheses is first, so (6-3) is first

4 – 3[4 – 6] ÷ 2
4 – 3[–2] ÷ 2
4 + 6 ÷ 2
4 + 3
7

1/3 represents 3 actual miles on a map. What is the distance between 2 people that are 5 inches apart from eachother?

A. 45 miles  
B. 50 miles  
C. 20 miles  
D. 48.5 miles  
E. 15 miles

The correct answer is: A  
Rationale for correct answer:  
take 5 times 3 to get 15.  
Multiply 15 times three and the answer is 45 miles

Related ND Math Standards: 7.G.1
ABC Travel Agency surveyed a random sample of 55 of their clients about their vacation plans. Of the clients surveyed, 13 expected that they would go on 3 vacations in the next year. There are 330 ABC Travel Agency clients total. About how many people would you suspect will go on 3 vacations next year?

A) 6 passengers

B) 25 passengers

C) 52 passengers

D) 78 passengers

The correct answer is: D
Rationale for correct answer: You can use the small random sample to make a generalization and estimation of the total population. If 13/55 said they'd go on 3 vacations in the next year, then we can use that same ratio to estimate the total number of people going on 3 vacations. $13/55 = x/330$, which is $55x = 4290$. Then, $x = 78$ passengers.

Related ND Math Standards: 7.SP.1, MP.4
The sum of three numbers is 14. The largest is 4 times the smallest, while the sum of the smallest and twice the largest is 18. Find the numbers.

Numbers = ___, ___, ___
The correct answer is: A
Rationale for correct answer: A is the only image that is correctly rotated 120 degrees clockwise, around the origin

Related ND Math Standards: 8.G.3
A bag contains 100 solid colored eggs, of which 45 are yellow and the rest are either purple or green. If one egg is to be selected at random from the bag, the probability that the egg selected will be green is 1/5. How many purple eggs are in the bag?

A) 25  
B) 30  
C) 15  
D) 65  
E) 35

The correct answer is: E
Rationale for correct answer: out of 100 eggs 45 yellow and 1/5 of 100 which is 20, so 45+20= 65  100-65= 35 purple eggs

Related ND Math Standards: S.MD.1, 2, 3, 4
If you are given the expression $x^2+3y=25$, what are the value(s) of $x$ if $y$ is equal to 3?

A: +4

B: 8

C: +4, -4

D: $16/3$

The correct answer is: C

Rationale for correct answer: if $y=3$ we have $x^2+3*3=25$. You subtract 9 on both sides and get $x^2=16$, because of the squared this has 2 solutions as shown in letter C, A has one of the right solutions but is missing the $-4$ so the answer is C

Related ND Math Standards: 6.EE.2 MP (1,4,5,6,8)
The recipe for a single cake requires 5 eggs. Cartons of eggs are sold at the grocery only in packs of 12. Allyson needs to bake 10 cakes for Penelope's birthday bash. How many cartons of eggs will she need to buy in order to have enough eggs to bake all the cakes?

A) 1 carton  
B) 2 cartons  
C) 3 cartons  
D) 4 cartons  
E) 5 cartons

The correct answer is: E  
Rationale for correct answer: If Allyson wants to bake 10 cakes, she needs 5 eggs per cake; 10*5 = 50 eggs total. When buys eggs, they only come in cartons of 12. 4 cartons would give Allyson 48 eggs. She needs two more, so she must buy another carton giving her 5 total cartons.

Related ND Math Standards: 6.RP.1, 6.RP.2, MP(1,2,6,8)
Clare recorded the amounts of time spent doing homework, in hours per week, by students in sixth, eighth, and tenth grades. She made a dot plot of the data for each grade and provided the following summary:

- Students in sixth grade tend to spend less time on homework than students in eighth and tenth grades.
- The homework times for the tenth-grade students are more alike to each other than the homework times for the eighth-grade students.

Use Clare's summary to match each dot plot to the correct grade (sixth, eighth, or tenth).

Grade 6: 
Grade 8: 
Grade 10: 

The correct answer is: Grade 6: B; Grade 8: A; Grade 10: C
Rationale for correct answer: The first clue given says Grade 6 spends less time on homework than Grade 8 and Grade 10. The only graph that has lower values is Graph B. The second clue says Grade 10 has more alike values than the eighth grade students. Graph C has a smaller range of values because the time is similar in 16-18.

Related ND Math Standards: 7.SP.3; 6.SP.4; MP 4, MP 6
A certain animated movie earned $1.1 \times 10^9$ in revenues at the box office. The movie lasts $9.1 \times 10^1$ minutes.

Approximately how much revenue was earned per minute at the movie?

A. $1.27 \times 10^8$
B. $8.27 \times 10^7$
C. $8.27 \times 10^8$
D. $1.21 \times 10^7$
E. None of the Above

The correct answer is: D
Rationale for correct answer: Look to divide the revenue by the time the movie lasted. $1.1 \times 10^9 / 9.1 \times 10^1$.

1.1/9.1 approx. Equals 0.121 and $10^9/10^1$ equals $10^8$

Putting them together equals $0.121 \times 10^8$.

Put into proper scientific notation equals $1.21 \times 10^7$. It subtracts a power because it moves the decimal to the left a place value.
Carter has 37 coins, all nickels and dimes. The value in total is $3.10. How many dimes does Carter have?

A. 23  
B. 24  
C. 27  
D. 25

The correct answer is: 25
Rationale for correct answer:
Equation 1: \(0.05x + 0.10y = 3.10\)
Equation 2: \(x + y = 37\).
\[0.05x + 0.10y = 3.10\]
\[x + y = 37\]
\[0.05y = 1.25\]
\[y = 25\]  
Carter has 25 dimes

Related ND Math Standards: 5.MD.1 7.EE.4  6.RP.3    7.EE.3
A triangle has lengths of 32 and 14. Which of the following could be the length of the third side?

A) 17  
B) 22  
C) 50  
D) 104  
E) 5

The correct answer is: B  
Rationale for correct answer:  
The length of the third side must be between 32 + 14 with is 46 and 32 - 14 which is 18

Related ND Math Standards: 8.G.7
A town's total limit for firefighter's wages and benefits in a new budget is $600,000. If wages are calculated at $40,000 per firefighter and benefits at $20,000 per firefighter. How many firefights can be hired?

A) 15 firefighters

B) 20 firefighters

C) 36 firefighters

D) 10 firefighters

The correct answer is: D

Rationale for correct answer: We can setup the equation: total amount = total wages per firefighter + total benefits per firefighter. So, $600,000 = 40,000x + 20,000x$ which is equal to $600,000 = 60,000x$. $X = 10$ firefighters. This means that each firefighter would receive $60,000 in wages and benefits.

Related ND Math Standards: 6.EE.6, MP.3, MP.5
Question 45

Which is the value of x?

A) 2  
B) 4  
C) 6  
D) 8  
E) 10

The correct answer is: B
Rationale for correct answer:
The Pythagorean theorem states (leg 1 length)^2 + (leg 2 length)^2 = (hypotenuse length)^2
8^2 + (11+x)^2 = 17^2
64 + (11+x)^2 = 289
(11+x)^2 = 225
11+x = 15
x=4

Related ND Math Standards: HS.GSRT.8*, MP1, MP4, MP6
The correct answer is: B

Rationale for correct answer: On the vertical axis, each 5 squares represent a population of 1,000. So each one square represents 200. The dot for the year 1900 is 4 squares above zero. Therefore the population in 1900 was $4 \times 200 = 800$

Related ND Math Standards: 5.G.2
There are 150 basketball and hockey players in a school. If there are more basketball players than hockey players, how many hockey players are in the school?

Chose all statements that are sufficient to answer

A) The ratio of basketball players to hockey players
B) Percent of basketball players compared to everyone in the school
C) Difference of varsity starters to JV starters

The correct answer is: A
Rationale for correct answer: A is the only one who compares basketball players to hockey players, the other two compare other things.

Related ND Math Standards: S.CP.1, 2, 3, 4, 5
You owe a friend $4000 and your payment plan is $250 per month. Which of the following expressions represents what you owe your friend after x months.

A: 250 - 4000x

B: 250x - 4000

C: 4000x - 250

D: 4000 - 250x

The correct answer is: D

Rationale for correct answer: if you pay 250 dollars a month, that gives you 250x dollars each month you pay. Since the initial value is 4000, the answer is D: 4000 - 250x

Related ND Math Standards: 6.EE.6 MP(1,3,4,7)
Last year, a computer cost $1,275. This year the same computer cost $1,025. Approximately, what is the percent of change for the cost of the computer from last year to this year?

A) 20% increase
B) 20% decrease
C) 24% increase
D) 24% decrease
E) 80% decrease

The correct answer is:  B
Rationale for correct answer: The percent change is approximately \((1025 - 1275)/1275 = -0.1961\) or about -20%. Because the answer is negative, it is a decrease, therefore the answer is B.

Related ND Math Standards: 7.RP.3, 7.EE.3, MP(1,2,4,6)
Mrs. Fields’ science class takes care of a plant at school. The class is responsible for watering the plant and measuring its growth. The students’ measurements are charted in the table.

<table>
<thead>
<tr>
<th>Number of Months (m)</th>
<th>Height of the Plant (h) in inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>23</td>
</tr>
</tbody>
</table>

Which of the following equations relates the height of the plant, \( h \), and the number of months, \( m \), assuming a constant rate of growth?

A. \( 5m + 3 = h \)
B. \( 4m = h \)
C. \( 8m - 5 = h \)
D. \( 3m + 5 = h \)

The correct answer is: A

Rationale for correct answer: The difference between the growth of each month is 5 inches; looking at the growth of each month, the plant’s height increases 5 inches each month. If the rate of growth is constant, then the beginning height of the plant is 3 inches; the height at the first month (8 inches) minus the growth of that month (5 inches) would equal 3 inches. If the growth of each month is 5 inches, then one can find the height of the plant by the growth of each month (5 inches) multiplied by the month (\( m \)) and then add 3 inches to account for the initial height. \( 5m + 3 = h \).
The Ming family has a backyard kiddie pool. The pool is 2 feet tall and the bottom of the pool has a diameter of 10 feet. The wall of the pool is 1-foot wide. After a lot of splashing one afternoon, the pool is only half full.

What is the volume of water remaining in the pool?

(The volume of a cylinder is \( V=\pi(r^2)h \).)

A. 16\( \pi \) feet cubed  
B. 32\( \pi \) feet cubed  
C. 25\( \pi \) feet cubed  
D. 50\( \pi \) feet cubed  
E. 8\( \pi \) feet cubed

The correct answer is: A

Rationale for correct answer: First, look for the variables to put into the volume equation. The radius will be 4 ft since the entire pool's diameter is 10 feet but has a 1 ft thick wall. So if you half the diameter it is 5 ft, but the 1 ft wall makes it 4. Put the variables into the volume formula:

\[
V = \pi \cdot 4^2 \cdot 2 \\
V = \pi \cdot 16 \cdot 2 \\
V = 32\pi
\]

But if half of the water is gone, we divide it by two. The remaining volume is 16\( \pi \).

Related ND Math Standards: 8.G.9
Miss Larson took 10 math tests in one marking period. The scores were, 63, 89, 69, 73, 84, 91, 99, 87, 77, 94
What is the range of her test scores?

A. 84  
B. 31  
C. 36  
D. 80

The correct answer is: 36
Rationale for correct answer: The first thing to do is to list the numbers in order.
63, 69, 73, 77, 84, 87, 89, 91, 94, 99
Then, you need to take the highest and subtract the lowest.
99-63 = 36

Related ND Math Standards: 6.SP.2  6.SP.3  6.SP.5  8.SP.1  HS.SID.2*
An oak tree is 9 meters tall and a bird is standing on the ground 12 meters from the tree. If the bird flies directly to the top of the tree, how far will it fly?

A) 12  
B) 8  
C) 5  
D) 15  
E) 22  

The correct answer is: D
Rationale for correct answer:  
9 squared equals 81 and 12 squared equals 144  
81+144 equals 225  
Square root of 225 equals 15  
Therefore, the answer is D  

Related ND Math Standards:  8.G.7,
Question 54

The number of fish, \( f \), at a pet store is 4 more than 7 times the number of puppies, \( p \), at the pet store. Write the equation for the number of fish at the pet store.

A) \( f = (p+4) \times 7 \)
B) \( f = 7p + 4 \)
C) \( f = 4(p+7) \)
D) \( f = 4p + 7p \)

The correct answer is: B
Rationale for correct answer: the number of fish \( f \) = 4 more than 7 times \( p \)
\[ F = 4 + 7p \] which can also be written as \( f = 7p + 4 \).
None of the other equations follow the right order as described in the word problem.

Related ND Math Standards: 5.OA.2, 6.EE.6, HS.F-BF.4*, MP.1, MP.7
A python curls up to touch the tip of its own tail with its nose, forming the shape of a circle. The python is $2.6\pi$ meters long. What is the radius of the circle?

A) $r = 1.1$ m  
B) $r = 1.3$ m  
C) $r = 2.2$ m  
D) $r = 2.6$ m  
E) $r = 3.0$ m

The correct answer is: B
Rationale for correct answer:
The circumference of the circle the python creates is $2.6\pi$. Use this to solve for the radius.

\[
C = 2\pi r \\
2.6\pi = 2 \pi \cdot r \\
2.6 = 2 \cdot r \\
1.3 = r
\]

Related ND Math Standards: 7.G.4, MP1, MP4, MP6, MP7
Choose the which answer has the correct order, from smallest, to largest.
A) $1\frac{1}{2}$, $\frac{6}{1}$, $2\frac{1}{4}$, $2\frac{1}{2}$, $\frac{6}{3}$, $\frac{14}{2}$
B) $1\frac{1}{2}$, $\frac{6}{3}$, $2\frac{1}{4}$, $2\frac{1}{2}$, $\frac{6}{1}$, $\frac{14}{2}$
C) $1\frac{1}{2}$, $\frac{6}{3}$, $2\frac{1}{2}$, $2\frac{1}{4}$, $\frac{6}{1}$, $\frac{14}{2}$
D) $1\frac{1}{2}$, $2\frac{1}{4}$, $\frac{6}{3}$, $2\frac{1}{2}$, $\frac{6}{1}$, $\frac{14}{2}$
E) No correct answers

The correct answer is: B
Rationale for correct answer: The correct order is B, because in decimal point, the order looks like this, 1.5, 2, 2.25, 2.5, 6, 7

Related ND Math Standards: 5.NF.5