

## ACT Math Exam

### Volume: 152 Questions

Question No: 1

A store prices a coat at \$85. During a sale, the coat is sold at 20% off. After the sale, the store raises the price of the coat 10% over its sale price. What is the price of the coat now?

- A. \$18.70
- B. \$61.20
- C. \$68.00
- D. \$74.80
- E. \$93.50

Answer: D

Explanation:

20% of \$85 =  $(0.20)(\$85) = \$17$ . While on sale, the coat is sold for  $\$85 - \$17 = \$68$ ; 10% of \$68 =  $(0.10)(\$68) = \$6.80$ . After the sale, the coat is sold for  $\$68 + \$6.80 = \$74.80$ .

Question No: 2

The length of an edge of a cube is equal to half the height of a cylinder that has a volume of 160 cubic units. If the radius of the cylinder is 4 units, what is the surface area of the cube?

- A. 64 square units
- B. 96 square units
- C. 100 square units
- D. 125 square units
- E. 150 square units

Answer: E

Question No: 3

The function  $m \# n$  is equal to  $n$ . Which of the following is equivalent to  $m \# (n \# m)$ ?

## ACT Math Exam

- A. n
- B. m
- C. + m
- D. (n n
- E. ( m m

Answer: C

Question No: 4

Melissa runs the 50-yard dash five times, with times of 5.4 seconds, 5.6 seconds, 5.4 seconds, 6.3 seconds, and 5.3 seconds. If she runs a sixth dash, which of the following would change the mean and mode of her scores, but not the median?

- A. 5.3 seconds
- B. 5.4 seconds
- C. 5.5 seconds
- D. 5.6 seconds
- E. 6.3 seconds

Answer: A

Explanation:

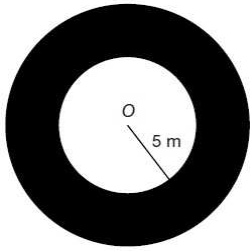
Melissa's mean time for the first five dashes is Her times, in

$$\frac{5.4 + 5.6 + 5.4 + 6.3 + 5.3}{5} = \frac{28}{5} = 5.6.$$

order from least to greatest, are: 5.3, 5.4, 5.4, 5.6, and 6.3. The middle score, or median, is 5.4. The number that appears most often, the mode, is 5.4. A score of 5.3 means that the mean will decrease and that the mode will no longer be 5.4 alone. The mode will now be 5.3 and 5.4. The median, however, will remain 5.4.

Question No: 5

## ACT Math Exam



The radius of the outer circle shown above is 1.2 times greater than the radius of the inner circle. What is the area of the shaded region?

- A. 6 m<sup>2</sup>
- B. 9 m<sup>2</sup>
- C. 25 m<sup>2</sup>
- D. 30 m<sup>2</sup>
- E. 36 m<sup>2</sup>

Answer: B

Question No: 6

If  $m = 6$ , then the expression is equal to

$$\frac{m^2}{3} - 4m + 10$$

- A. 12.
- B. 2.
- C. 6.
- D. 12.
- E. 22.

Answer: B

Explanation:

Substitute 6 for  $m$ :

$$\frac{6^2}{3} - 4(6) + 10 = \frac{36}{3} - 24 + 10 = 12 - 14 = -2.$$

## ACT\_Math Exam

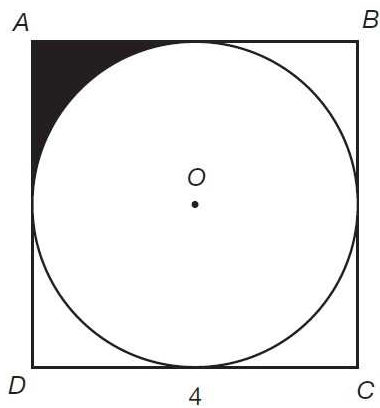
Question No: 7

The area of an isosceles right triangle is  $18 \text{ cm}^2$ . What is the length of the hypotenuse of the triangle?

- A. 6 cm
- B.  $6\sqrt{2}$  cm
- C. 18 cm
- D.  $18\sqrt{2}$  cm
- E. 36 cm

Answer: B

Question No: 8



In the diagram above, the length of a side of square ABCD is four units. What is the area of the shaded region?

- A.  $4\sqrt{16}$
- B. 4
- C.  $4\sqrt{4}$
- D. 16
- E.  $16\sqrt{4}$

Answer: B

## ACT Math Exam

Question No: 9

The value of  $d$  is increased 50%, then decreased 50%. Compared to its original value, the value of  $d$  is now

- A. 25% smaller.
- B. 25% larger.
- C. 50% smaller.
- D. 50% larger.
- E. the same.

Answer: A

Explanation:

To increase  $d$  by 50%, multiply  $d$  by 1.5:  $d = 1.5d$ . To find 50% of  $1.5d$ , multiply  $1.5d$  by 0.5:  $(1.5d)(0.5) = 0.75d$ . Compared to its original value,  $d$  is now 75% of what it was. The value of  $d$  is now 25% smaller.

Question No: 10

The average of five consecutive odd integers is 21. What is the least of these integers?

- A. 17
- B. 19
- C. 21
- D. 23
- E. 25

Answer: E

Explanation:

If the average of five consecutive odd integers is 21, then the third integer must be 21. The two larger integers are 19 and 17 and the two lesser integers are 23 and 25. 25 is the least of the five integers. Remember, the more a number is negative, the less is its value.

## ACT Math Exam

Question No: 11

If the height of a cylinder is doubled and the radius of the cylinder is halved, the volume of the cylinder

- A. remains the same.
- B. becomes twice as large.
- C. becomes half as large.
- D. becomes four times larger.
- E. becomes four times smaller.

Answer: C

Explanation:

The volume of a cylinder is equal to  $r^2h$ , where  $r$  is the radius of the cylinder and  $h$  is the height. The volume of a cylinder with a radius of 1 and a height of 1 is  $\pi(1)^2(1) = \pi$ . If the height is doubled and the radius is halved, then the volume becomes  $\pi\left(\frac{1}{2}\right)^2(2) = \pi\left(\frac{1}{4}\right)2 = \frac{1}{2}\pi$ . The volume of the cylinder has become half as large.

Question No: 12

The ratio of the number of cubic units in the volume of a cube to the number of square units in the surface area of the cube is 2:3. What is the surface area of the cube?

- A. 16 square units
- B. 24 square units
- C. 64 square units
- D. 96 square units
- E. 144 square units

Answer: D

Explanation:

The volume of a cube is equal to  $e^3$ , where  $e$  is the length of an edge of the cube. The surface area of a cube is equal to  $6e^2$ . If the ratio of the number of cubic units in the volume to the number of

## ACT Math Exam

square units in the surface area is 2:3, then three times the volume is equal to two times the surface area:

The edge of the cube is four units and the surface  $3e^3 = 2(6e^2)$  area of the cube is square units.

Question No: 13

Which of the following sets of numbers contains all and only the roots of the equation  $f(x) = x^3 + 7x^2 - 8x$ ?

- A. {8, -1}
- B. {8, 1}
- C. {0, -8, 1}
- D. {0, 8, 1}
- E. {0, 1, 8, 1, 8}

Answer: C

Explanation:

The roots of an equation are the values for which the equation evaluates to zero. Factor . When  $x^3 + 7x^2 - 8x$ :  $x^3 + 7x^2 - 8x = x(x^2 + 7x - 8) = x(x + 8)(x - 1)$  or the equation is equal to zero. The set of roots is

$x = 0, -8,$

Question No: 14

An empty crate weighs 8.16 kg and an orange weighs 220 g. If Jon can lift 11,000 g, how many oranges can he pack in the crate before lifting it onto his truck?

- A. 12
- B. 13
- C. 37
- D. 46
- E. 50

## ACT Math Exam

Answer: A

Explanation:

The empty crate weighs 8.16 kg, or 8,160 g. If Jon can lift 11,000 g and one orange weighs 220 g, then the number of oranges that he can pack into the crate is equal to  $\frac{11,000-8,160}{220} = \frac{2,840}{220} \approx$  cannot pack a fraction of an orange. He can pack whole oranges into the crate.

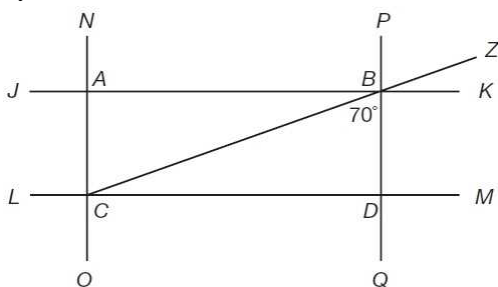
Question No: 15

The measures of the length, width, and height of a rectangular prism are in the ratio 2:6:5. If the volume of the prism is 1,620 mm<sup>3</sup>, what is the width of the prism?

- A. 3 mm
- B. 6 mm
- C. 9 mm
- D. 18 mm
- E. 27 mm

Answer: D

Question No: 16



In the diagram above, lines NO and PQ are parallel to each other and perpendicular to lines JK and LM. Line JK is parallel to line LM. If angle CBD is 70 degrees, what is the measure of angle ZBK?

- A. 10 degrees
- B. 20 degrees
- C. 70 degrees



## ACT Math Exam

- D. 90 degrees
- E. 110 degrees

Answer: B

Explanation:

Angle CBD and angle PBZ are alternating angles--their measures are equal. Angle PBZ = 70 degrees. Angle PBZ + angle ZBK form angle PBK. Line PQ is perpendicular to line JK; therefore, angle PBK is a right angle (90 degrees). Angle ZBK = angle PBK - angle PBZ = 90 - 70 = 20 degrees.

Question No: 17

Monica sells pretzels in the cafeteria every school day for a week. She sells 14 pretzels on Monday, 12 pretzels on Tuesday, 16 pretzels on Wednesday, and 12 pretzels on Thursday. Then, she calculates the mean, median, and mode of her sales. If she sells 13 pretzels on Friday, then

- A. the mode will increase.
- B. the mean will stay the same.
- C. the median will stay the same.
- D. the median will decrease.
- E. the mean will increase.

Answer: C

Explanation:

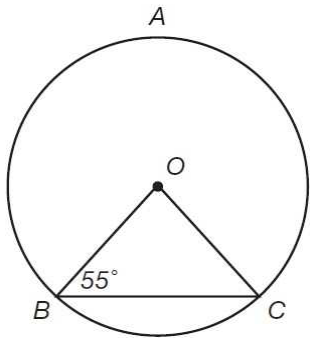
For the first four days of the week, Monica sells 12 pretzels, 12 pretzels, 14 pretzels, and 16 pretzels. The median value is the average of the second and third values: If Monica sells

$$\frac{12+14}{2} = \frac{26}{2} = 13.$$

13 pretzels on Friday, the median will still be 13. She will have sold 12 pretzels, 12 pretzels, 13 pretzels, 14 pretzels, and 16 pretzels. The median stays the same.

Question No: 18

## ACT Math Exam



In the diagram above, side OB side OC. Which of the following is the measure of minor arc BC?

- A. 27.5 degrees
- B. 45 degrees
- C. 55 degrees
- D. 70 degrees
- E. 110 degrees

Answer: D

Explanation:

Line OB line OC, which means the angles opposite line OB and OC (angles C and B) are congruent.

Since angle B = 55 degrees, then angle C = 55 degrees. There are 180 degrees in a triangle, so the measure of angle O is equal to  $180 - (55 + 55) = 180 - 110 = 70$  degrees. Angle O is a central angle. The measure of its intercepted arc, minor arc BC, is equal to the measure of angle O, 70 degrees.

Question No: 19

Four copy machines make 240 total copies in three minutes. How long will it take five copy machines to make the same number of copies?

- A. 2 minutes
- B. 2 minutes, 15 seconds
- C. 2 minutes, 24 seconds
- D. 2 minutes, 45 seconds