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High School HSGQE-Math

Alaska High School Math Exit Examination (HSGQE)

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Question: 1

The symbol \sim is defined by $a \sim b = (a / b)^{1/2}$
What is the value of $(48 \sim 3) \sim 2$?

- A. $\sqrt{2}$
- B. 2
- C. $\sqrt{3}$
- D. $2\sqrt{6}$

Answer: A

Explanation:

$$48 \sim 3 = (48 / 3)^{1/2} = 16^{1/2} = 4$$

$$\therefore (48 \sim 3) \sim 2 = 4 \sim 2 = (4 / 2)^{1/2} = 2^{1/2} = \sqrt{2}$$

The tires on the wheels of Tom's truck have a diameter of 21 inches.

Question: 2

If Tom's truck travels 6 miles, how many revolutions do the wheels make?
Use $22/7$ as an approximation for π .

- A. 5760
- B. 5765
- C. 2444
- D. 5680

Answer: A

Explanation:

Step 1. Find the circumference of the tire:

$$C = \pi d = 22/7 * 21 \text{ inches} = 66 \text{ inches}$$

This is the distance the truck moves forward as the wheels rotate once.

Step 2. Find the total distance in inches, recalling that there are 1760 yards in a mile, 3 feet in a yard, and 12 inches in a foot. (=5280 feet in a mile and 12 inches in a foot. Use whichever figures are easier to remember.)

$$6 \text{ miles} = 6 * 1760 * 3 * 12 \text{ inches} = 380160 \text{ inches (or } 6 * 5280 * 12 = 380160 \text{ inches)}$$

Step3 . Divide the total distance by the distance moved in one revolution:

$$\therefore \text{Number of revolutions} = (6 * 1760 * 3 * 12) / 66 = (1760 * 36) / 11 = 160 * 36 = 5760$$

Ten students gained the following marks in a test:

7, 12, 2, 4, 13, 8, 2, 1, 3 and 2

Question: 3

Which of the following statements is true?

- A. Mean = median = mode
- B. Mean < median < mode
- C. Median < mean < mode
- D. Mode < median < mean

Answer: D

Explanation:

First put the scores into order of size:

1, 2, 2, 2, 3, 4, 7, 8, 12, 13

Mean = Sum of marks / 10 = 54 / 10 = 5.4

Median = Mean of the middle two marks = Mean of 3 and 4 = 3.5

Mode = Most frequent mark = 2

Therefore, mode < median < mean

Question: 4

If $x < 1$ and $x^2 = 1$, what is the value of x ?

- A. 0.5
- B. -1
- C. 1
- D. 2

Answer: B

Explanation:

The only two numbers that equal 1 when squared are 1 and -1. But x cannot equal 1, because you are told $x < 1$. So x must be -1.

Question: 5

Which of the following is equivalent to $(7x + 12y) * 4$?

- A. $7x + 48y$
- B. $7x + 12y * 4$
- C. $28x + 48y$
- D. $14x + 48y$

Answer: C

Explanation:

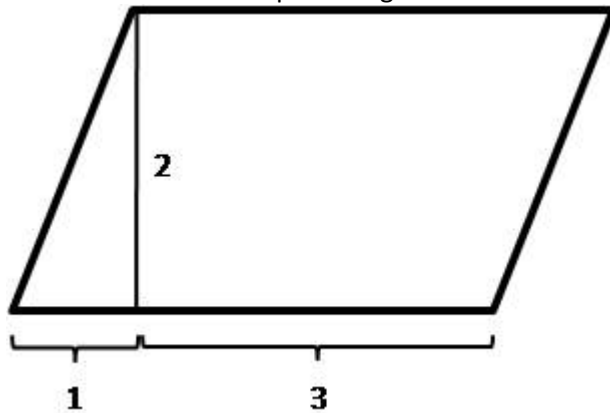
When a number is multiplied by an expression that is in parentheses, that number must be distributed, or multiplied by all parts of the expression.

In the question, 4 must be multiplied by $7x$ but also by $12y$. That is the case in Answer C, therefore Answer C is the correct choice.

Answer B is not right because it completely ignores the parentheses and, if solved, would result in a different solution than the expression given in the equation.

Question: 6

What is the area of the parallelogram?



- A. 6
- B. 8
- C. 12
- D. $6 + \sqrt{2}$

Answer: B

Explanation:

As it is drawn, this parallelogram shows a triangle and an odd polygon, together forming a parallelogram. Imagine sliding the triangle to the right so that the parallelogram forms a rectangle instead. If done correctly, the new rectangle should now have a length of 4 ($3 + 1$) and a height of 2.

The area of a rectangle is length * height (which is equivalent to saying length * width) so:

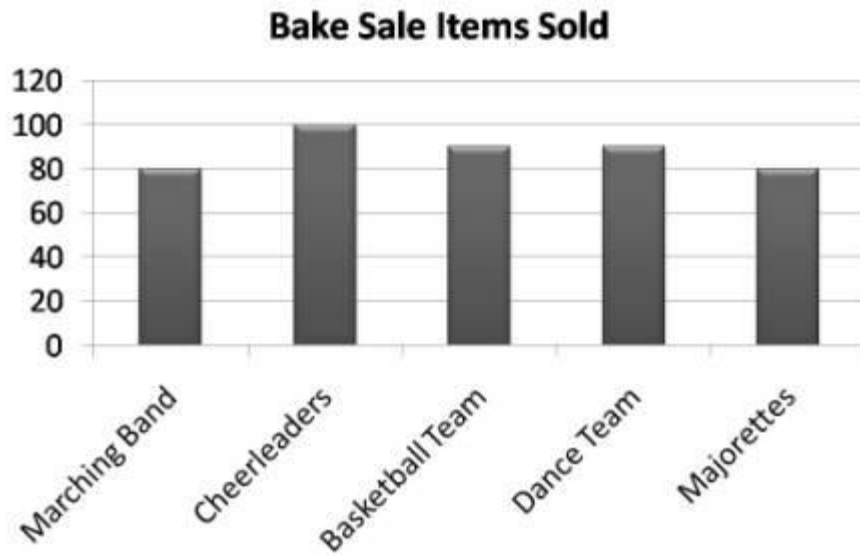
length * height = area

$$4 * 2 = 8.$$

In general, the area of a parallelogram is found by multiplying the length of the base by the height.

Question: 7

The graph on the left shows the number of items sold during a bake sale.



How many total bake sale items were sold by all the groups?

- A. 400 items
- B. 360 items
- C. 440 items
- D. 350 items

Answer: C

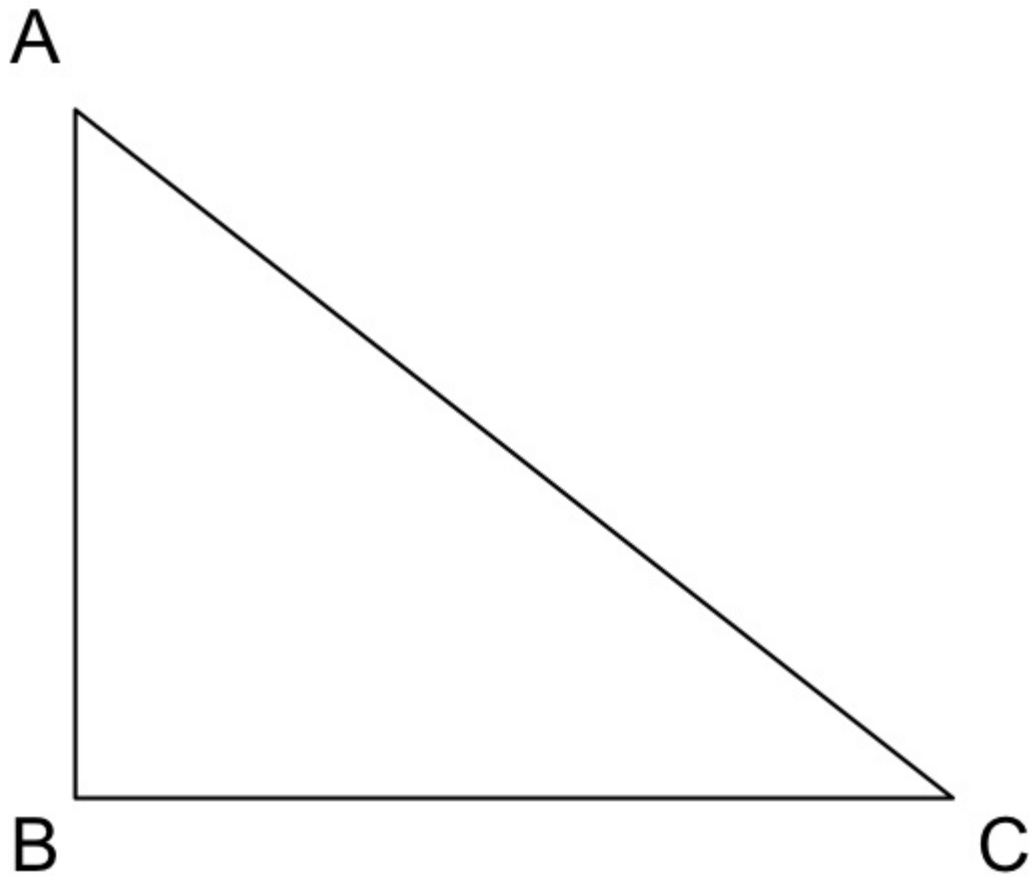
Explanation:

To solve, total the number of items sold by each group:

$$80 + 100 + 90 + 90 + 80 = 440 \text{ items}$$

Question: 8

If angle $ABC = 90^\circ$ and angle $BAC = 48^\circ$, what is the value of angle ACB ?



- A. 50°
- B. 60°
- C. 42°
- D. 40°

Answer: C

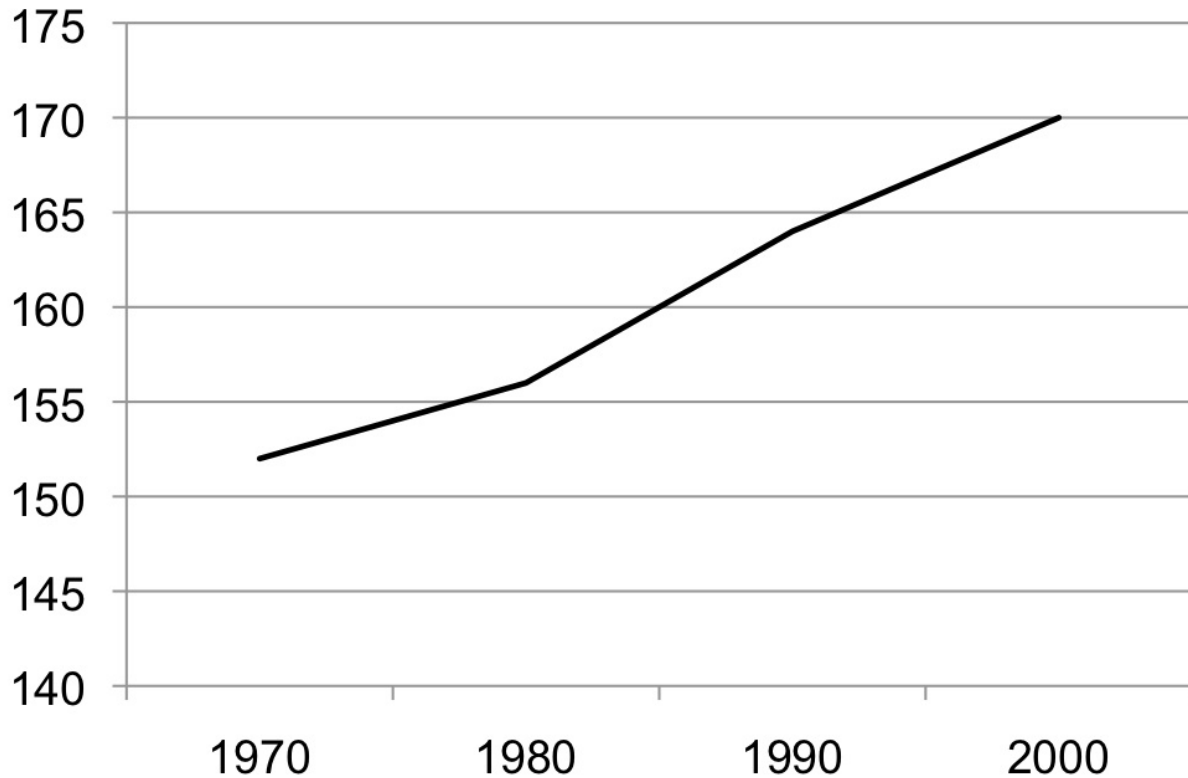
Explanation:

The sum of the angles in a triangle is 180° . The other two angles add up to 138° , so angle ACB must be 42° .

Question: 9

In 2000, John's weight was 10% above average. How much did he weigh?

Average Weight of Adult Males (pounds)



- A. 170 pounds
- B. 187 pounds
- C. 180 pounds
- D. 192 pounds

Answer: B

Explanation:

The average weight for adult males in 2000 was 170 pounds. If John weighed 10% more than this, he weighed 110% of 170. Convert 110% to a decimal by moving the decimal point two places to the left. $110\% = 1.1$. Now multiply 1.1 times the average weight. $1.1 * 170 = 187$.

Question: 10

Each swimming instructor teaches at least 4, but no more than 6, classes a week. Class sizes range from 4 to 8. What are the fewest and the most students an instructor might teach in a week?

- A. 16 and 40

- B. 16 and 48
- C. 32 and 48
- D. 18 and 48

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| Answer: B |
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Explanation:

If an instructor teaches only 4 classes of 4 in a week, the instructor will teach only 16 students. At the other end of the spectrum, if an instructor teaches 6 classes of 8 in a week, the instructor will teach 48 students.



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