PHILIPPINE REVIEW CENTER

FOR SUB-PROFESSIONAL AND PROFESSIONAL EXAM
(2018)

MATHEMATICAL WORD PROBLEMS

(WITH ANSWER KEY)

1. There are 600 pupils in a school. The ratio of boys to girls in this school is 3:5. H ow many girls and how many boys are in this school?

   Solution

   In order to obtain a ratio of boys to girls equal to 3:5, the number of boys has to be written as 3 x and the number of girls as 5 x where x is a common factor to th e number of girls and the number of boys. The total number of boys and girls is 600. Hence

   $3x + 5x = 600$

   Solve for x

   $8x = 600$

   $x = 75$

   Number of boys

   $3x = 3 \times 75 = 225$

   Number of girls

   $5x = 5 \times 75 = 375$

2. There are **r** red marbles, **b** blue marbles and **w** white marbles in a bag. Write the ratio of the number of blue marbles to the total number of marbles in terms of **r**, **b** and **w**.

   Solution

   The total number of marbles is

   r + **b** + **w**

   The total ratio of blue marbles to the total number of marbles is

   r / (**r** + **b** + **w)**

3. The perimeter of a rectangle is equal to 280 meters. The ratio of its length to its width is 5:2. Find the area of the rectangle.

Solution

If the ratio of the length to the width is 5:2, then the measure L of the length and and the measure W of the with can be written as

L = 5x and W = 2x

We now use the perimeter to write

280 = 2(2L + 2W) = 2(5x + 2x) = 14x

Solve for x

280 = 14x

x = 280 / 14 = 20

The area A of the rectangle is given by

$A = L \times W = 5x \times 2x = 10x^2 = 10 \times 20^2 = 4000$ square meters

4 The angles of a triangle are in the ratio 1:3:8. Find the measures of the three angles of this triangle.

Solution

If the ratio of the three angles is 1:3:8, then the measures of these angles can be written as x, 3x and 8x. Also the sum of the three interior angles of a triangle is equal to 180°. Hence

x + 3x + 8x = 180

Solve for x

12x = 180

x = 15

The measures of the three angles are

x = 15°

3x = 3 × 15 = 45°

$8x = 8 \times 15 = 120°$

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5 The measures of the two acute angles of a right triangle are in the ratio 2:7. What are the measures of the two angles?

Solution

If the ratio of the two angles is 2:7, then the measures of two angles can be written as 2x and 7x. Also the two acute angles of a triangle is equal to 90°. Hence

$2x + 7x = 90$

$9x = 90$

$x = 10$

Measures of the two acute angles are

$2x = 2 \times 10 = 20°$

$7x = 7 \times 10 = 70°$

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6. A jar is filled with pennies and nickels in the ratio of 5 to 3 (pennies to nickels). There are 30 nickles in the jar, how many coins are there?

   Solution

   A ratio of pennies to nickels of 5 to 3 means that we can write the number of pennies and nickels in the form

   number of pennies = 5x and number of nickels = 3x

   But we know the number of nickels, 30. Hence

   $3x = 30$

   Solve for x

   $x = 10$

The total number of coins is given by

$5x + 3x = 8x = 8 \times 10 = 80$

7. A rectangular field has an area of 300 square meters and a perimeter of 80 meters. What is the ratio of the length to the width of this field?

Solution

Let L and W being the length and the width (with L > W) of the rectangular field. The area and the perimeter are given; hence

$L \times W = 300$ (I)

$2L + 2W = 80$ (II) which is equivalent to $L + W = 40$ (III)

We need to find the ratio L / W. Equation (I) gives

$W = 300 / L$

Substitute W by 300 / L in equation (III)

$L + 300 / L = 40$

Multiply all terms in the above equation by L and simplify

$L^2 + 300 = 40L$

Rewrite the equation in standard form, factor and solve

$L^2 - 40 L + 300 = 0$

$(L - 10)(L - 30) = 0$

Solutions: L = 10 and L = 30

We now calculate W

For L = 10 , W = 300 / L = 300 / 10 = 30 m

For L = 30 , W = 300 / L = 300 / 30 = 10

Since L > W, we select the soultion

L = 30 and W = 10

and the L / W is equal to

30 / 10 = 3 / 1 or 3:1

8. Express the ratio 3 2/3 : 7 1/3 in its simplest form.

   Solution

   We first convert the mixed numbers 3 2/3 and 7 1/3 into fractions

   3 2/3 = 3*3 / 3 + 2 / 3 = 11 / 3

   7 1/3 = 7*3 / 3 + 1 / 3 = 22 / 3

   The ratio 3 2/3 : 7 1/3 can be expressed as

   11 / 3 ÷ 22 / 3 = 11 / 3 × 3 / 22

   Simplify

   = 11 / 22 = 1 / 2

   The ratio is 1 / 2 or 1:2

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9. The length of the side of square A is twice the length of the side of square B. What is the ratio of the area of square A to the area of square B?

   Solution

   Let x be the length of the side of square A and y be the length of the side of square B with x = 2 y. Area of A and B are given by

   $A = x^2$ and $B = y^2$

But x = 2y. Hence

$A = (2y)^2 = 4\ y^2$

The ratio of A to B is

$4\ y^2 / y^2 = 4 / 1$ or 4:1

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10. The length of the side of square A is half the length of the side of square B. What is the ratio of the perimeter of square A to the perimeter of square B?

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11. At the start of the week a bookshop had science and art books in the ratio 2:5. By the end of the week, 20% of each type of books were sold and 2240 books of both types were unsold. How many books of each type were there at the start of the week?

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12. At the start of the month a shop had 20-inches and 40-inches television sets in the ratio 4:5. By the end of the month, 200 20-inches and 500 40-inches were sold and the ratio of 20-inches to 40-inches television sets became 1:1. How many television sets of each type were there at the start of the month?

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13. The aspect ratio of a tv screen is the ratio of the measure of the horizontal length to the measure of the vertical length. Find the horizontal length and vertical height of a tv screen with an aspect ratio of 4:3 and a diagonal of 50 inches.

Answers to the Above Questions

1. 375 girls , 225 boys:
2. b / (r + b + w)
3. 4000 square meters
4. 15 degrees, 45 degrees and 120 degrees
5. 20 degrees and 70 degrees
6. 80 coins (pennies and nickels)

7. 3:1
8. 1:2
9. 4:1
10. 1:2
11. 800 science books and 2000 art books
12. 1200 20-inches and 1500 40-inches
13. horizontal length = 40 inches and vertical length = 30 inches