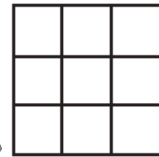


Warm-Up 15

181. $\frac{7}{18}$

The figure shown consists of a large square divided into nine smaller, congruent squares. If a rectangle is chosen at random from this figure, what is the probability that it is a square? Express your answer as a common fraction.



Rectangles
 12 (2x1)
 6 (3x1)
 4 (3x2)

 22

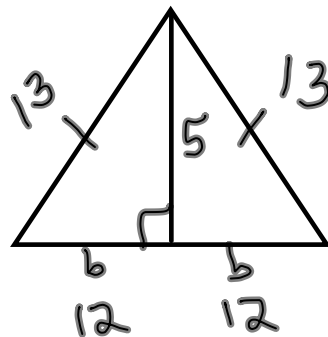
Rectangles that are squares
 9 (1x1)
 4 (2x2)
 1 (3x3)

 14

$$22 + 14 = 36$$

$$\frac{14}{36} = \frac{7}{18}$$

182. _____ cm² An isosceles triangle has two congruent sides of length 13 cm and a height of 5 cm. What is the area of the triangle?



$$13^2 = 5^2 + b^2$$

$$169 = 25 + b^2$$

$$144 = b^2$$

$$12 = b$$

$$\text{base} = 12 + 12 = 24$$

$$A = \frac{1}{2} b h = \frac{1}{2} (24) (5) = 60$$

183. _____ If n is an even integer such that $0 < n < 10$, what is the sum of all possible unit fractions of the form $\frac{1}{n}$? Express your answer as a common fraction.

$$\frac{1}{2} + \frac{1}{4} + \frac{1}{6} + \frac{1}{8} = \frac{12}{24} + \frac{6}{24} + \frac{4}{24} + \frac{3}{24}$$

$$LCD = 24$$

$$= \frac{25}{24}$$

184. _____ units The area of a particular rectangle is $2a^2 - ab - b^2$ units². If its width can be represented by the expression $a - b$, what is the length of the rectangle, in terms of a and b ?

$A = lw$ Factor
 $2a^2 - ab - b^2 = (a-b)l$
Factor $2a^2 - ab - b^2$
 $2a^2 - 2ab + ab - b^2$
 $2a(a-b) + b(a-b)$
 $(2a+b)(a-b)$

$p = -2$
 $s = -1$
 $-2 \cdot 1$

or $A = lw$ Divide
 $\frac{A}{w} = l$
 $\frac{2a^2 - ab - b^2}{a-b}$
 $\begin{array}{r} 2a+b \\ a-b \overline{) 2a^2 - ab - b^2} \\ \underline{2a^2 - 2ab} \\ ab - b^2 \\ \underline{ab - b^2} \\ 0 \end{array}$

185. _____ mi/h If Mike travels for 3 hours at a rate of 20 mi/h and then travels for 2 hours at a rate of 30 mi/h, what is his average speed, in miles per hour?



Mike 1st trip $r \quad t \quad d$
 $20 \cdot 3 = 60$
 2nd trip $30 \cdot 2 = 60$
 $5 \text{ hr } 120 \text{ miles}$
 $r = d \div t = 120 \div 5 = 24 \text{ mph}$

186. _____ ints How many different, positive four-digit integers, with no repeated digits, can be formed using the digits 0 through 9?

$9 \cdot 9 \cdot 8 \cdot 7 = 4536$

(9 for 1st digit (can't use zero))

187. _____ cm³ A right circular cylinder has a surface area of 160π cm². If the height of the cylinder is twice the diameter of the base, what is the volume of the cylinder? Express your answer in terms of π .

$$SA = 2\pi r^2 + \pi d h$$

$$160\pi = 2\pi r^2 + \pi(2r)(4r)$$

$$160\pi = 2\pi r^2 + 8\pi r^2$$

$$160\pi = (2\pi + 8\pi)r^2$$

$$\frac{160\pi}{10\pi} = \frac{10\pi r^2}{10\pi}$$

$$16 = r^2 \quad h = 4r = 4 \cdot 4 = 16$$

$$V = \pi r^2 h$$

$$= \pi(16)(16)$$

$$= 256\pi$$

188. _____ toy animals Ben and Jerry each have a collection of toy animals. Ben collects only two-legged toy animals and Jerry collects only toy animals with four legs. Jerry has 10 more toy animals than Ben. There are 220 legs in their combined collections. How many toy animals does Jerry have?

$$x = \# \text{ of Ben's toys}$$

$$x + 10 = \# \text{ of Jerry's toys}$$

$$2x = \# \text{ of legs of Ben's toys}$$

$$4(x + 10) = \# \text{ of legs of Jerry's toys}$$

$$2x + 4x + 40 = 220 \text{ legs}$$

$$6x + 40 = 220$$

$$6x = 180$$

$$x = 30$$

$$x + 10 = 30 + 10 = 40 \text{ toys}$$



189. _____ Five blue marbles and five green marbles are randomly arranged in a row. What is the probability that the marbles alternate in color? Express your answer as a common fraction.



$$B G B G B G B G B G \quad + \quad G B G B G B G B G B$$

$$5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 \cdot 4 \cdot 3 \cdot 2 \cdot 1 \cdot 4 \cdot 3 \cdot 2 \cdot 1$$

$$\frac{5! \cdot 4! \cdot 4!}{10!} = \frac{1}{252}$$

$$\frac{2}{252} = \frac{1}{126}$$

190. _____ % If the volume of an enlarged cube is 8 times the volume of the original cube, by what percent has the length of each edge increased?

$$\left(\frac{1}{s}\right)^3 s^3 \Rightarrow 8(s^3)$$

$$2^3 \cdot s^3$$

$$|+1| = 2 \text{ so increased by } 100\%$$

191. factors How many factors of 2940 are perfect squares?

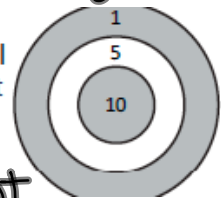
$$\begin{array}{c}
 2940 \\
 \wedge \\
 294 \cdot 10 \\
 \wedge \quad \wedge \\
 6 \cdot 49 \cdot 2 \cdot 5 \\
 \wedge \quad \wedge \quad \wedge \quad \wedge \\
 2 \cdot 3 \cdot 7 \cdot 7 \cdot 2 \cdot 5
 \end{array}$$

Perfect Squares are

$$\begin{array}{l}
 (1) \\
 2 \cdot 2 = (4) \\
 7 \cdot 7 = (49) \\
 2 \cdot 2 \cdot 7 \cdot 7 = (196)
 \end{array}$$

(4) perfect squares

192. scores Michael will throw three darts that will hit the dartboard shown. His total score will be the sum of the scores for the three hits. How many different total scores could Michael earn?



Same region
all 3

$$\begin{array}{l}
 1+1+1=3 \\
 5+5+5=15 \\
 10+10+10=30 \\
 \hline
 3
 \end{array}$$

1 region twice
other once

$$\begin{array}{l}
 1+1+5=7 \\
 1+1+10=12 \\
 5+5+1=11 \\
 5+5+10=20 \\
 10+10+1=21 \\
 10+10+5=25 \\
 \hline
 6
 \end{array}$$

all hit
on different
region

$$\begin{array}{l}
 1+5+10=16 \\
 \hline
 1
 \end{array}$$

(10) ways

193. For what value of x does $2^{18} = \left(\frac{1}{4}\right)^x$?

$$\begin{array}{l}
 2^{18} = \left(\left(\frac{1}{2}\right)^2\right)^x \\
 2^{18} = \left(\left(2^{-1}\right)^2\right)^x = 2^{-2x}
 \end{array}$$

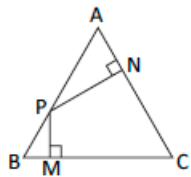
$$18 = -2x$$

$$(-9) = x$$

194. _____ m³ A spherical balloon contains 5 cubic meters of air. If it is inflated so that its diameter doubles, what will be the volume of air in the balloon?

$V = \frac{4}{3}\pi r^3$ diameter doubles
 radius doubles
 $2^3 = 8$ times bigger
 $5 \cdot 8 = 40$

195. _____ cm

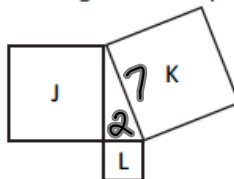


In the equilateral triangle ABC, shown here, $\overline{PM} \perp \overline{BC}$ and $\overline{PN} \perp \overline{AC}$. If $AB = 12$ cm, what is the value of $CM + CN$?

$\Delta PAN = 30-60-90$
 $\Delta PBM = 30-60-90$

$2x + 2y = AB = 12$
 $x + y = 6$
 $CM + CN = 12 - x + 12 - y$
 $= 24 - (x + y)$
 $= 24 - 6$
 $= 18$

196. _____ cm² A right triangle is formed by the sides of three squares, as shown. The side length of the square labeled K is 7 cm, and the side length of the square labeled L is 2 cm. What is the area of the square labeled J?



$7^2 = 2^2 + b^2$
 $49 = 4 + b^2$
 $45 = b^2$

[]

197. _____ Kathy ate one-eighth of the jelly beans in a jar, and Sue ate one-fifth of the rest. Pat ate twice as many jelly beans as Kathy and Sue combined, and then Drew ate the rest. What is the ratio of the number of jelly beans Drew ate to the number of jelly beans Pat ate? Express your answer as a common fraction.

$x = \# \text{ of jelly beans}$

Kathy = $\frac{1}{8}x$

Sue = $\frac{1}{5}(x - \frac{1}{8}x) = \frac{1}{5}(\frac{7x}{8}) = \frac{7x}{40}$

Pat = $2(\frac{1}{8}x + \frac{7x}{40}) = 2(\frac{5x}{40} + \frac{7x}{40})$
 $= 2(\frac{12x}{40}) = \frac{12x}{20}$

Drew $x - (\frac{12x}{20} + \frac{7x}{40} + \frac{1}{8}x)$
 $x - (\frac{24x}{40} + \frac{7x}{40} + \frac{5x}{40}) = x - \frac{36x}{40} = \frac{4x}{40} = \frac{x}{10}$

$\frac{\text{Drew}}{\text{Pat}} = \frac{\frac{x}{10}}{\frac{12x}{20}} = \frac{x}{10} \cdot \frac{20}{12x} = \frac{2}{12} = \frac{1}{6}$

198. _____ integers Randolph's favorite positive integers each have three digits and obey the following rules:

- All three digits are different.
- The sum of the digits is 9.

How many different favorite positive integers could Randolph have?

1 2 6 3! = 6 ways (zero can't be in first place)

5 4 0 - 4 way

2 3 4 3! = 6 ways 2 7 0 - 4 ways

3 6 0 - 4 ways

1 3 5 3! = 6 way 8 1 0 - 4 ways

$\frac{72}{12} = 34 \text{ ways}$

199. (,) What is the y-intercept of the line that contains the points (2, 0) and (4, -3)? Express your answer as an ordered pair.

Slope = $\frac{-3-0}{4-2} = \frac{-3}{2}$

$y-0 = \frac{-3}{2}(x-2)$

$y = \frac{-3}{2}x + 3$

if $x=0$ $y=3$

$(0, 3)$

200. _____ The median of an ordered set of 11 integers is 35. In this set, the median of the first five integers is 29, and the median of the last five integers is 39. If the minimum and maximum values of the set are 12 and 52, respectively, what is the greatest possible value of the mean of this set?

median = 35 (11 integers 5 above, 5 below)

median of last 5 = 39 (2 above, 2 below)

median of first 5 = 29

Smallest # = 12

maximum # = 52

12, 29, 35, 39, 52

≤ 29 ≤ 35 ≤ 39 ≤ 52 (greatest mean)

29 35 35 39 39 52

Adding up and \div by 11 mean = 36