

171. **78** pennies Mollie has fewer than 100 pennies. If she puts the pennies in stacks of five, there are three pennies left over. If Mollie puts them in stacks of seven, there is one penny left over. If she puts them in stacks of three, there are no pennies left over. What is the total number of pennies Mollie has?

stacks of 3 - remainder = 0 so # is
Multiple of 3

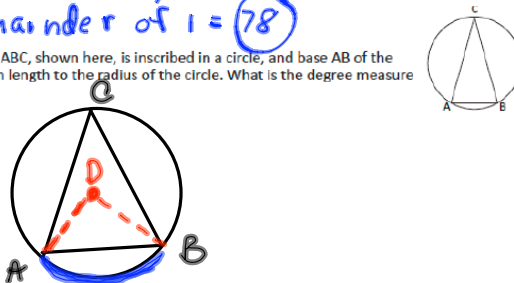
: by 5 has remainder of 3
since # : by 7 end in 0, # must
end in $0+3=3$ or $5+3=8$

multiples of 3 ending in 3 or 8 are

18, 33, 48, 63, 78, 93

: by 7 remainder of 1 = **78**

172. **30** degrees Isosceles triangle ABC, shown here, is inscribed in a circle, and base AB of the triangle is equal in length to the radius of the circle. What is the degree measure of $\angle C$?



Draw radii of circle to points A & B
 \overline{AD} & \overline{DB}

Arc $\widehat{AB} = \angle ADB$

$\triangle ADB$ is equilateral $\overline{AD} = \overline{DB}$
Since $\overline{AB} = \text{radius}$ (radii are equal)
& therefore $= \overline{AD} + \overline{DB}$

every \angle in $\triangle ADB = 60^\circ$ (sum of \angle s of $\triangle = 180^\circ$
so $180^\circ \div 3 = 60^\circ$)

so $\angle ADB = 60^\circ$ & $\widehat{AB} = 60^\circ$

and $\angle ACB = \frac{1}{2} \widehat{AB}$ (inscribed $\angle = \frac{1}{2}$ the arc
 $\angle ACB = \frac{1}{2}(60) = 30^\circ$ formed by it)

173. **18.50** The price of a shirt was reduced by 20%. Including the 5% sales tax, Cyndi paid \$15.54 for the shirt. What was the original price of the shirt before the discount was applied?

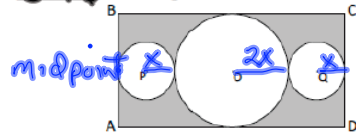
- Reduced 20% you pay 80% of total
- 5% tax added, you pay 105% of total

Cyndi pays

105% of 80% of the cost of original price
 $1.05 (.8) x = 15.54$

$$\begin{array}{r} .84x = 15.54 \\ \cdot 84 \quad \cdot 84 \\ \hline x = 18.50 \end{array}$$

174. 52.6 In the figure shown, circles P and Q are congruent, and the radius of circle O is twice that of each of the smaller circles. Circle P is tangent to rectangle ABCD at the midpoint of AB, and circle Q is tangent to rectangle ABCD at the midpoint of CD. Circle O is tangent to each of the smaller circles and is tangent to two sides of rectangle ABCD. If the radius of circle O is 4 in, what is the total area of the shaded regions? Express your answer as a decimal to the nearest tenth.



radius of circle O = $4 = \frac{2x}{2}$
 $(2) = x$

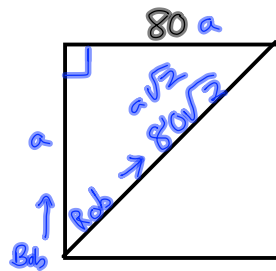
$\left. \begin{matrix} 4 \\ 4 \end{matrix} \right\} 8$

$l = 16$
 $A_{\text{rectangle}} = 8 \cdot 16 = 128$
 Subtract 3 circles = shaded region
 Circle P = $\pi r^2 = 2^2\pi = 4\pi$
 Circle Q (same as P) = 4π
 Circle O = $\pi(4)^2 = 16\pi$
 $A = 128 - 24\pi = 52.6$

175. 17 The four positive integers P, Q, P + Q and P - Q are all prime and their sum is S. What is the value of S?

All primes > 2 are odd
 Sum of 2 odds is always even.
Our sum = 5 which is odd then one # must be even so one prime = 2
 Since 2 is the only even prime.
 Let $Q = 2$
 $P + Q = P + 2$ So distance between
 $P - Q = P - 2$ 2 #'s $P + 2$ & $P - 2$
 must $(P + 2 - (P - 2))$
 $(P + 2 - P + 2)$
 (4)
 #'s are 4 apart that we are looking for & P must be prime
so $P - 2, P, P + 2$ + consecutive
 only possibility is 3, 5, 7
 (because after this triple the next odd is \neq by 3)
so 2, 3, 5, 7 are our numbers
 Add & we get $2 + 3 + 5 + 7 = 17$

176. 11.3 ^{mi/h} A square measures 80 yd on a side. Bob and Rob begin running from the same corner. Bob runs along a side to an adjacent corner, and Rob runs along a diagonal to an opposite corner. They arrive at their respective corners at the same time. If Bob's speed was 8 mi/h, what was Rob's speed? Express your answer as a decimal to the nearest tenth.



$$rt = d$$

$$t = d/r$$

$a\sqrt{2}$ = length of hypotenuse (diagonal)

$$\text{Bob} = t = \frac{80}{8}$$

$$\text{Rob} = t = \frac{80\sqrt{2}}{r}$$

$$\frac{80}{8} = \frac{80\sqrt{2}}{r} = 80r = 8(80)\sqrt{2}$$

$$r = 8\sqrt{2} \approx \textcircled{11.3}$$

177. 2 ^{intgrs} For how many positive integers n is the mean of the set $\{9, 5, 10, 12, n\}$ equal to its median?

$$5 + 9 + 10 + 12 = 36$$

median is either 9 or 10

to get a mean of 9 = $5 \cdot 9 = 45$
 so $n = 45 - 36 = \textcircled{9}$

to get a mean of 10 = $5 \cdot 10 = 50$
 so $n = 50 - 36 = \textcircled{14}$

2 integers

178. 33/50 Students were asked to vote for one of the five choices listed for the new school mascot. Based on this data, what is the probability that a student selected at random from those who voted will be a student who did not vote in favor of Grizzly Bear as the school mascot? Express your answer as a common fraction.

Mascot	Number of Votes
Grizzly Bear	68
Bull Dog	12
Bald Eagle	24
Wildcat	44
Panther	52

$$68 + 12 + 24 + 44 + 52 = 200 \text{ students voted}$$

$$\# \text{ that did not vote for Grizzly Bear} = 200 - 68 = 132 \text{ students}$$

$$P = \frac{132}{200} = \textcircled{\frac{33}{50}}$$

179. 12 factors How many positive integer factors does 96 have?

$$96$$

$$\uparrow$$

$$8 \cdot 12$$

$$\downarrow \quad \downarrow$$

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

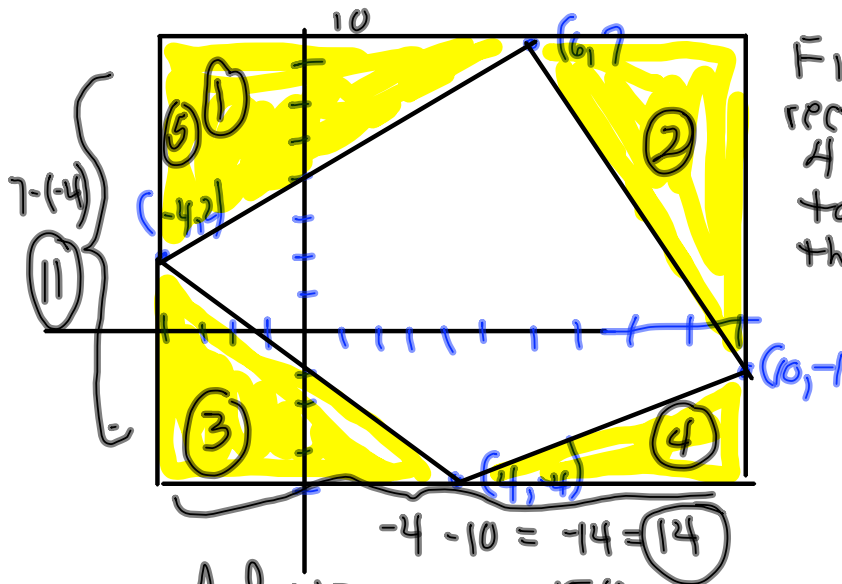
$$2^5 \cdot 3$$

6 possibilities
0, 1, 2, 3, 4 or 5 factors of 2
↓ 2 for 3, 0 or 1

6 · 2 = 12 positive integers
Rule $2^5 \cdot 3^1 = (5+1)(1+1) = 6 \cdot 2 = 12$

Do prime factorization
and add 1 to each exponent & multiply

180. 80 units² What is the area of the quadrilateral whose vertices are (4, -4), (-4, 2), (6, 7) and (10, -1)?



Find area of
rectangle & subtract
4 triangles in yellow
to get area of
the quadrilateral

$$A = l \cdot w = 11 \cdot 14 = 154$$

4 triangles

$$\textcircled{1} = \frac{1}{2}(5)(10) = 25 \quad \textcircled{3} = \frac{1}{2}(6)(8) = 24$$

$$\textcircled{2} = \frac{1}{2}(4)(8) = 16 \quad \textcircled{4} = \frac{1}{2}(6)(3) = 9$$

$$154 - (25 + 16 + 24 + 9) = 154 - 74 = \textcircled{80}$$