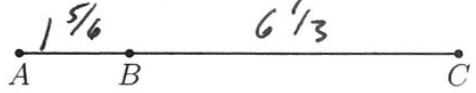
BECA / Dr. Huson / Geometry
Unit 1: Segments, length, and area
23 Sept 2022

Name: SOLUTIONS

**1.12 Extension unit test: Confidence intervals, absolute value, scientific notation**

1. Given $\overline{ABC}$, $AB = 1\frac{5}{6}$, and $AC = 6\frac{1}{3}$. Find $BC$.




$1\frac{5}{6} + 6\frac{2}{6} = 8\frac{1}{6}$

2. Round each value to three sig figs

(a) 20,201,249 $20,200,000$ (population of New York State)

(b) 21,538,187 $21,500,000$ (population of Florida)

3. During COVID, New York Governor Cuomo criticized Florida Governor DeSantis, saying that Florida had more deaths than NY. What is the relative difference in population between the states expressed as a percentage? (i.e. % error by assuming NY actually has as many people as FL)

$$\varepsilon = \left| \frac{20,201,249 - 21,538,187}{20,201,249} \right| \times 100\% = 6.6180\ldots\% \approx 6.62\%$$

4. Given $x = -4$ simplify each expression. (try to do them without a calculator)

(a) $|2 + x| =$ 2

(b) $|2 - x| =$ 6

(c) $|x| - |x| =$ 0

(d) $2|x + 3| - 2x = 2(1) + 8 = 10$

5. Find all values of $x$ satisfying the equation. (show the two cases and checks)

$$5|x + 3| - 12 = 18$$

$$|x+3| = 6$$

$x+3 = +6$

$x = 3$

$5|(3)+3| - 12 \stackrel{?}{=} 18$

$30 - 12 = 18$ ✓

$x+3 = -6$

$x = -9$

$5|-9+3| - 12 \stackrel{?}{=} 18$

$5|-6| - 12 = 18$ ✓

$18 = 18$

6. The length of a piece of lumber is 96 inches plus or minus 1 inch. Express the length of the board in centimeters in the form $l \pm \epsilon$.

$= 2.54$ cm

$96 \text{ inches} \times \frac{2.54 \text{ cm}}{1 \text{ inch}} = 243.84$

$243.84 \pm 2.54$ cm

7. The earth's moon is approximately 238,900 miles from our planet.

   (a) Find the circumference of its orbit rounded to the *nearest thousand* miles. (assume a circular orbit)

$C = 2\pi(238{,}900) = 1{,}501{,}052.97\ldots \approx 1{,}501{,}000$ miles

   (b) Convert the result to scientific notation rounded to three sig figs

$1.50 \times 10^6$ miles

8. The dimensions of a rectangular sheet of plywood are 4 feet by 8 feet. Each length is accurate plus or minus one inch. Find the area of the plywood in square feet, rounded to three significant figures. Express the answer as an interval.

$4' \times 8' = 48 \times 96$ in

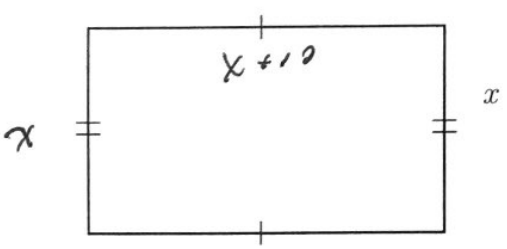
$1 \text{ sq ft} = 144 \text{ sq in}$

$A_{small} = 47 \times 95 = 4465 \text{ sq in} = 31.0069 \text{ sq. ft.} \approx 31.0$

$A_{Lg} = 49 \times 97 = 4753 = 33.0069 \text{ sq ft} \approx 33.0 \text{ sq. ft.}$

$(31.0, 33.0)$

9. A rectangle is 10 centimeters longer than it is wide. Given that its perimeter is 80 cm$^2$, find its *area*.




$x + 10$ cm

$P = 2x + 2(x+10) = 80$

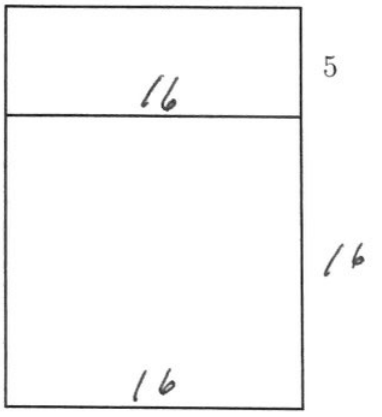
$4x + 20 = 80$

$4x = 60$

$x = 15$

check $A = 2(15) + (25)_2 = 80$ ✓

10. A thin rectangular strip with width $w = 5$ is shown on top of a larger square, below.




(a) The perimeter of the square is 64. Find the area of the square.

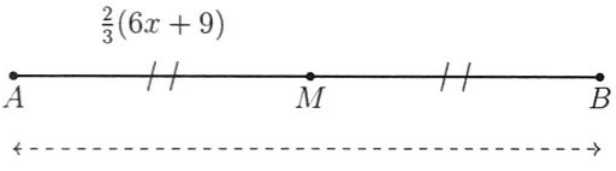
$P = 4s = 64$ $A = 16^2$
$s = 16$ $= 256$

(b) Find the area of the thin rectangle on top.

$A_R = 16 \cdot 5 = 80$

*All algebraic solutions require a check for full credit.*

11. Given that $M$ is the midpoint of segment $\overline{AB}$, $AM = \frac{2}{3}(6x + 9)$ and $AB = 28$. Find $x$.




$\frac{2}{3}(6x+9) = \frac{28}{2} = 14$

$2x + 3 = 7$

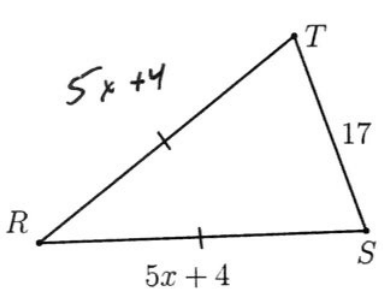
$x = 2$

check

$\frac{2}{3}(6(2)+9) = \frac{28}{2}$ ?

$\frac{2}{3}(21) = 14$ ✓

12. The isosceles $\triangle RST$ has a perimeter measuring 75. Given $RS = RT = 5x + 4$ and $ST = 17$, find $x$.




$2(5x+4) + 17 = 75$

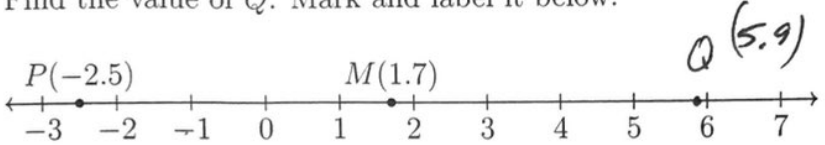
$5x + 25 = 29$

$x = 5$

check $5(5) + 4 = 29$

$29 + 29 + 17 = 75$ ✓

13. Point $M = (1.7)$ is the midpoint of $P = (-2.5)$ and $Q$, as shown on the number line. Find the value of $Q$. Mark and label it below.

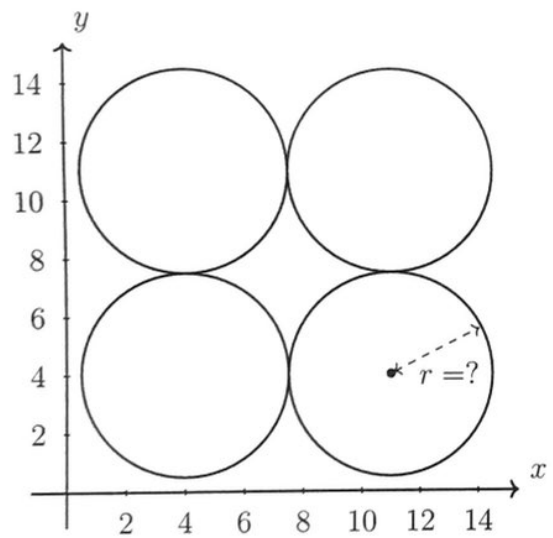



$Pm = 1.7 - (-2.5)$
$= 4.2$

$Q = m + 4.2$
$= 1.7 + 4.2$
$= 5.9$

check
$PQ = 5.9 - (-2.5)$
$= 8.4$
$m = \frac{-2.5 + 5.9}{2} = 1.7$ ✓

14. Four identical circles touch but do not overlap, as shown. Their total area is $49\pi$. Find the common radius $r$.




$A = 4(\pi r^2) = 49\pi$
$r^2 = \frac{49}{4}$
$r = \frac{7}{2}$

check $4\left(\pi\left(\frac{7}{2}\right)^2\right) = 4\pi\frac{49}{4} = 49\pi$ ✓

**Academic integrity pledge**

This assignment must be completed in one sitting. Use your notes and a calculator.

I have not received any human help on this assignment.

Signed: _____ _____

Date, start time - end time