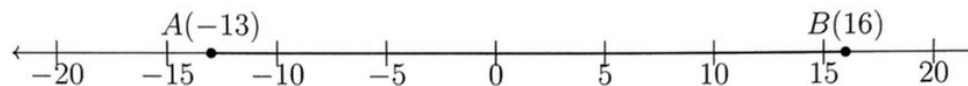**1.12 Test: Length and area**

Show units if given. Show calculation as an equation, starting with a capitalized variable.
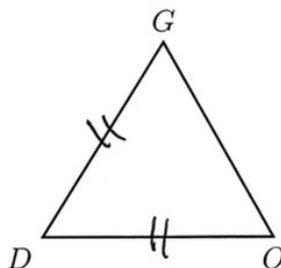
Line segments, length, number lines

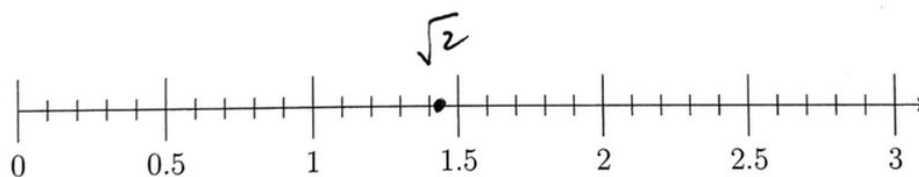1. Points $A = -13$ and $B = 16$ are shown below. Find the length of segment $\overline{AB}$.

$$AB = 16 - (-13) = 29$$

2. Isosceles $\triangle DOG$ has congruent sides $\overline{DO} \cong \overline{DG}$. Mark the congruencies with tick marks on the diagram.
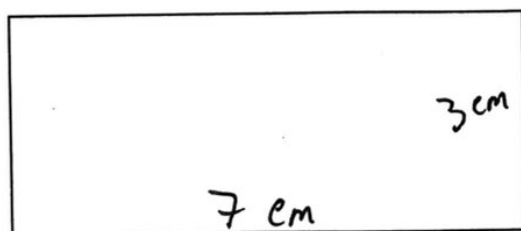

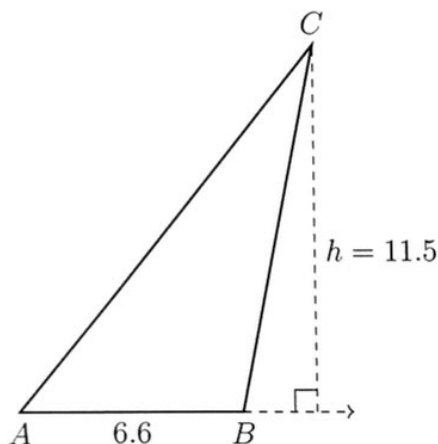3. Mark and label irrational number $\sqrt{2} = 1.41421356...$ on the number line below.

Perimeter and area

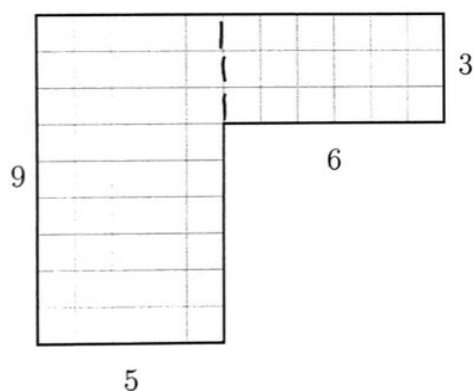4. Measure and mark the lengths of the sides of the rectangle in centimeters. Find its area.

$$A = 7 \cdot 3 = 21 \text{ cm}^2$$

3 cm

7 cm

5. Find the area of the triangle ABC. The $\triangle$'s height is $h = 11.5$ and its base measures $AB = 6.6$.

$$A = \frac{1}{2}(6.6)(11.5)$$
$$= 37.95$$

6. Find the area of the compound rectangular shape. Show the calculation as the sum of two rectangles.

$$A = 3 \cdot 6 + 9 \cdot 5$$
$$= 18 + 45$$
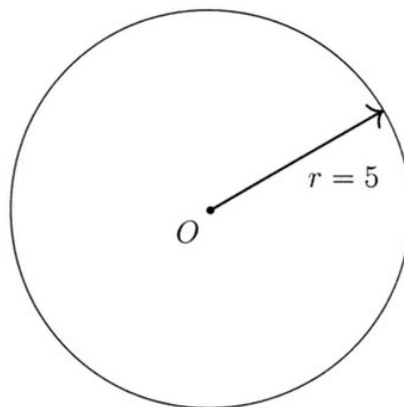$$= 63$$

7. Given the circle O with radius $r = 5$. Leave exact answers, in terms of π.
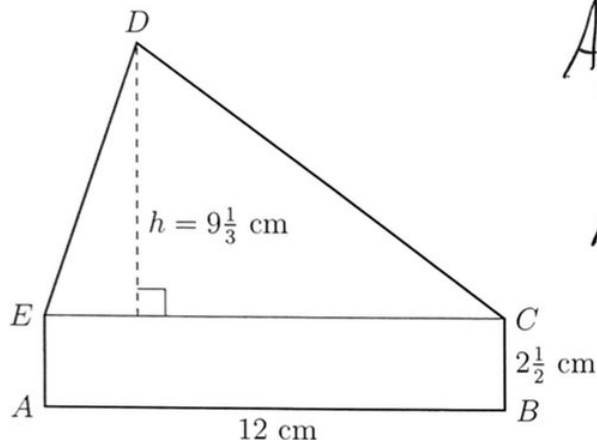
(a) Find the circumference of circle A.

$$C = 2\pi 5 = 10\pi$$

(b) Find the area of the circle.

$$A = \pi 5^2 = 25\pi$$

8. A triangle with 12 centimeter base and $9\frac{1}{3}$ cm height lies on top of a rectangle with the same base $AB = 12$ cm and a width of $2\frac{1}{2}$ cm. Find the area of the combined figure.

$$A_{\triangle} = \frac{1}{2}(12)(9\frac{1}{3})$$
$$= 56$$

$$A_R = 12 \times 2\frac{1}{2} = 30$$

$$A_T = 56 + 30$$
$$= 86 \quad cm^2$$

Precision, percent error

9. Round each value to the *nearest thousandth*.

   (a) $2\pi = 6.2831853...$
   $$\approx 6.283$$

   (b) $\sqrt{3} = 1.732050808...$
   $$\approx 1.732$$

10. Find the height in meters of a person 61 inches tall. Round to the *nearest hundredth of a meter* (i.e. nearest centimeter).

$$61 \times \frac{1\ m}{39.37\ in} = 1.549403...$$
$$\approx 1.55 \quad m$$

11. A palindrome is a word, phrase, or number that reads the same backwards and forwards. (e.g. "level", "racecar"). Find the % error in this palindromic approximation of pi.
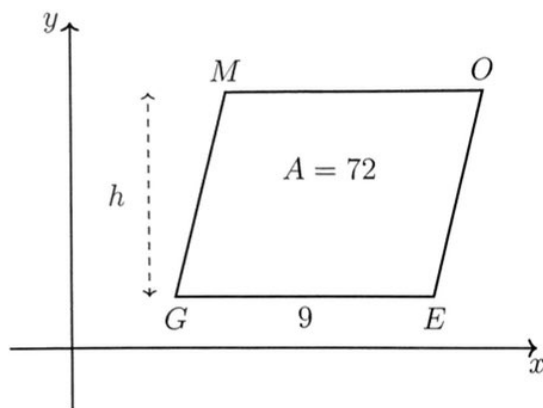
$$\pi \approx \frac{666}{212}$$

$$\% \mathcal{E} = \left| \frac{\left(\frac{666}{212} - \pi \right)}{\pi} \right| \times 100\%$$

$$= 0.00264896... \%$$

Modeling situations and solving with algebra

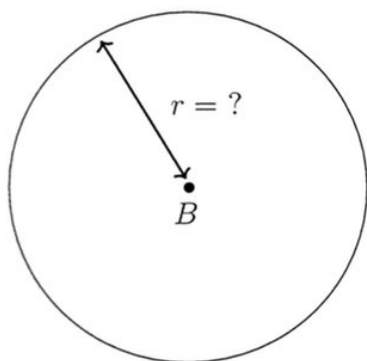12. The parallelogram $GEOM$ has an area $A = 72$ and base $GE = 9$. Find its height h.

$A = 9h = 72$

$h = 8$

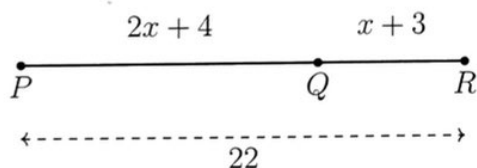13. The circle B has an area of $A = 36\pi$ square centimeters. Find the radius r.

Start with the formula

$A = \pi r^2 = 36\pi$

$\dfrac{}{\pi} \qquad \dfrac{}{\pi}$

$r^2 = 36$

$r = 6 \qquad cm$

14. Given $\overline{PQR}$, with $PQ = 2x + 4$, $QR = x + 3$, and $PR = 22$. Find PQ. (show check)

$(2x + 4) + (x + 3) = 22$

$3x + 7 = 22$

$3x = 15$

$x = 5$

check

$pq = 2(5) + 4 = 14$

$Q \angle = \quad 5 + 3 = 8$

$14 + 8 = 22$ ✓