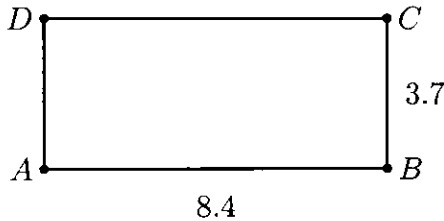**2.9 Exam: Area, perimeter, line segments**

1. Given the rectangle $ABCD$ shown below, with $AB = 8.4$ and $BC = 3.7$. Find the area of the rectangle.
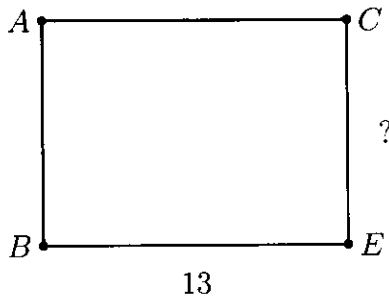

$A = 8.4 \times 3.7$

$= 31.08$

2

2. The rectangle $BECA$ has an area of 143, with length $BE = 13$. Find the width of the rectangle EC. (the drawing is not to scale)
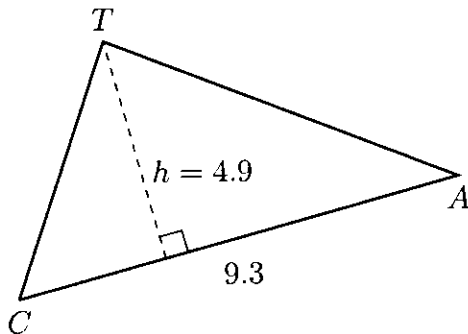

$A = 13x = 143$

$x = 11$

2

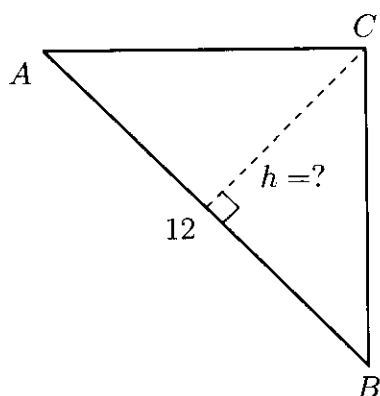3. Find the area of $\triangle CAT$. The altitude h of the triangle is 4.9 centimeters and the base $CA = 9.3$ cm.

$A = \frac{1}{2}(9.3)(4.9)$

$= 22.785$

2

6

4. One side of the $\triangle ABC$ has a length $AB = 12$. The triangle's area is 30. Find the length of the altitude h of the triangle to vertex C and perpendicular to side $\overline{AB}$.
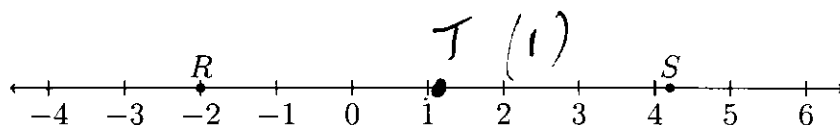

$A = \frac{1}{2}(12)x = 30$

$6x = 30$

$x = 5$

2

5. Given $\overleftrightarrow{RS}$ as shown on the number line, with $R = -2.0$ and $S = 4.2$.

(a) What is the exact distance on the number line between the points R and S?

$RS = 4.2 - (-2.0)$

$= 6.2$

4 (1)

(b) The point T bisects $\overline{RS}$. Find the value of T, and mark and label it on the numberline $\overleftrightarrow{RS}$.

$\frac{6.2}{2} = 3.1$

$T = R + \frac{1}{2}(RS)$

$= -2 + 3.1 = 1.1$ (1)

check

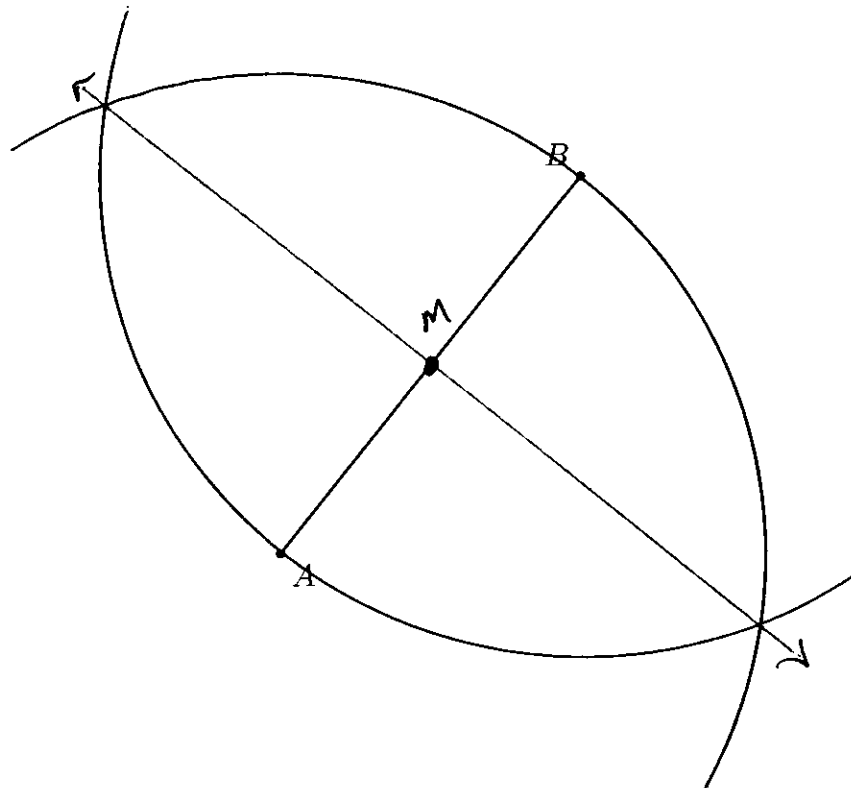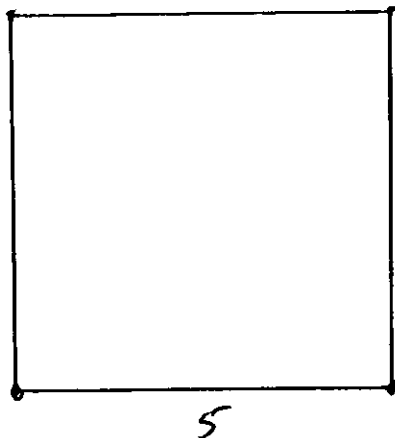$S - \frac{1}{2}RS = T$?

$4.2 - 3.1 = 1.1$ ✓

(5)

6. Complete the construction of a perpendicular bisector of $\overline{AB}$. Label the midpoint M. Show the construction marks, but make no extra lines.

3

7. Accurately draw a square that is 5 centimeters on each side.
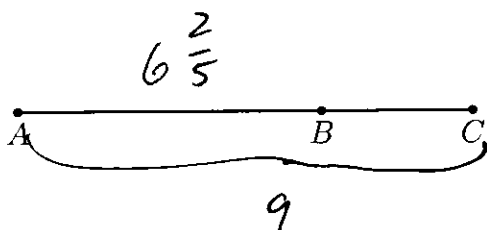
2

5

8. Given $\overline{ABC}$, $AB = 6\frac{2}{5}$, and $AC = 9$.

Find BC.

$$6\frac{2}{5} + x = 9$$
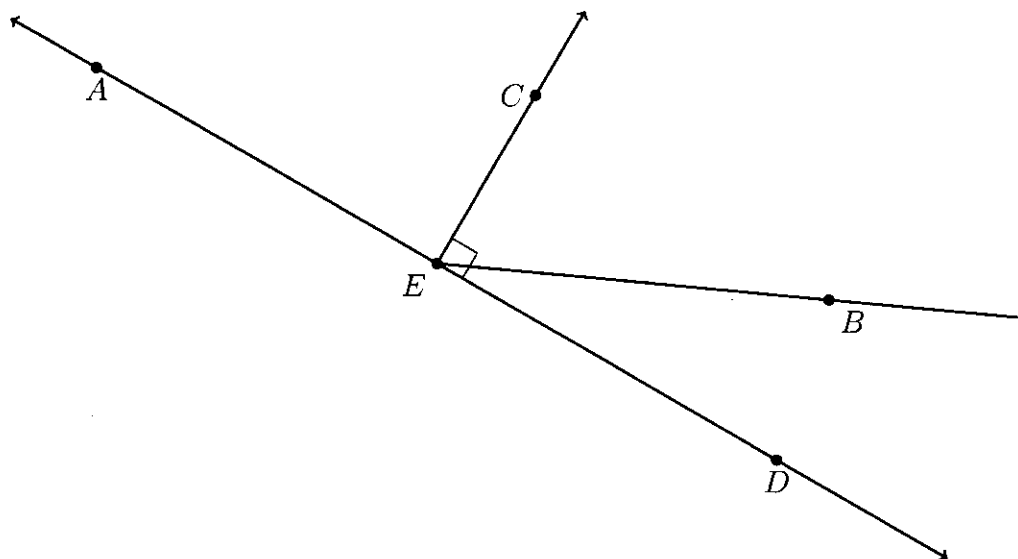
$$x = 2\frac{3}{5}$$

$$(= 2.6)$$

1

The postulate used in this problem is the _Segment addition_ postulate

(1)

9. Given the diagram shown below.

(a) Measure the angle AEB. $m\angle AEB = $ ___155°___ 1

(b) Name an angle that is complementary to $\angle DEB$: ___$\angle CEB$___ 1

(c) Name a pair of opposite rays: ___$\overrightarrow{EA}$ $\overrightarrow{ED}$___ 1

(5)

10. Find the perimeter P of the shape shown below, given the side lengths marked (not drawn to scale). All angles are 90°. Completely mark the diagram with the two missing lengths and show an equation for P as a sum of each side's length.
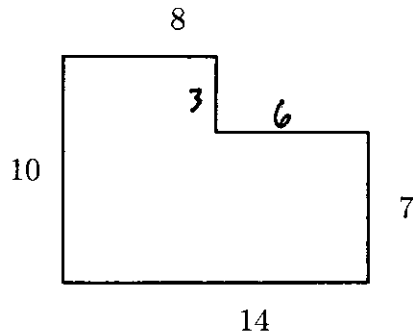
$P = 10 + 14 + 7 + 6 + 3 + 8$

$= 48$

2

11. Find the perimeter of a square with side length 7.25.

$P = 4s$
$= 4(7.25) = 29$

2

12. Given two complementary angles, $m\angle A = 5x + 14$ and $m\angle B = 3x - 12$. Find the measure of $\angle B$.

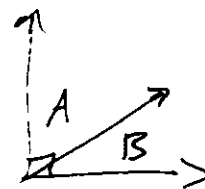$5x + 14 + 3x - 12 = 90$ ✓
$\qquad 8x + 2 = 90$
$\qquad 8x = 88$ ✓
$\qquad x = 11$ ✓

$m\angle B = 3(11) - 12$
$\qquad = 21$ ✓

$m\angle A = 5(11) + 14$
$\qquad = 69$

check ✓
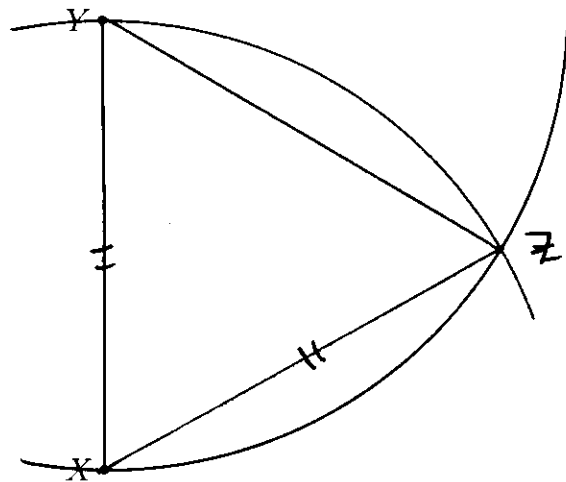$21 + 69 = 90$ ✓

$m\angle B = 21$

4

⑧

13. Complete the construction of an equilateral triangle with one side as $\overline{XY}$. Show the construction marks, but make no extra lines.

3

(a) Identify two circles in the construction. For each, name the center of the circle and the radius.

circle x, radius XY

circle y, $r = xy$

2

(b) Assuming that the third vertex of the triangle is point Z, explain why the distance from X to Z is the same as the distance from X to Y.

$\overline{XY} \cong \overline{XZ}$ because they are both radii of circle x, and a circle's radii are congruent

2

7

Complete all steps for full credit: the drawing to the top right, an equation and solution for x on the left, followed by the answer to the question. Write the check to the bottom right.

14. Given the collinear points P, Q, and R, with $PQ = 3x + 4$, $QR = 2x + 2$, and $PR = 4x + 10$. Find PR.
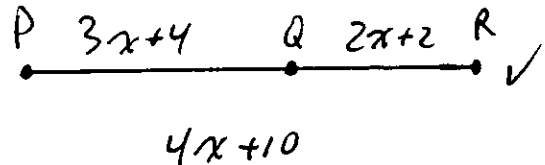
$$PQ + QR = PR$$
$$3x+4 + 2x+2 = 4x+10 \checkmark$$
$$5x + 6 = 4x + 10$$
$$x = 4 \checkmark$$
$$PR = 4(4)+10$$
$$= 26 \checkmark$$

P — $3x+4$ — Q $2x+2$ R $\checkmark$

$4x+10$

$\underline{check}$
$$PQ = 3(4)+4$$
$$= 16$$
$$QR = 2(4)+2 \qquad \checkmark \qquad 5$$
$$= 10$$
$$16 + 10 = 26 \checkmark$$

15. Angles M and N are supplementary. $m\angle M = x+29$ and $m\angle N = 3x-9$. Find $m\angle N$.
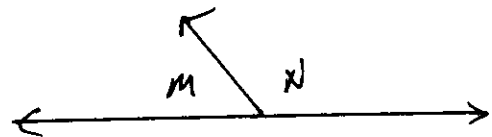
$$m\angle M + m\angle N = 180$$
$$x+29 + 3x-9 = 180 \checkmark$$
$$4x + 20 = 180$$
$$x = 40 \checkmark$$
$$m\angle N = 3(40)-9$$
$$= 111 \checkmark$$

$\underline{check}$
$$m\angle M = (40)+29 \checkmark \qquad 4$$
$$= 69$$
$$111 + 69 = 180 \checkmark$$

9

16. Given that E bisects $\overline{DF}$. $DE = 12x - 5$, $EF = 9x + 4$. Find EF.

$\overline{DE} \cong \overline{EF}$

$12x - 5 = 9x + 4$ ✓

$3x = 9$

$x = 3$ ✓

$EF = 9(3) + 4$

$= 31$ ✓

$12x - 5 \qquad 9x + 4$

$D \quad\quad E \quad\quad F$ ✓

check

$DE = 12(3) - \cancel{8} 5$

$= \cancel{36} 31$ ✓

$31 = 31$ ✓

5

Write the term that best completes each statement.

17. Two or more line segments of equal measure are __Congruent__ ✓

2

18. Points that are located on the same line are __Collinear__ ✓

Factor and solve for x.

19. $x^2 + 8x + 7 = 0$

$(x + 7)(x + 1) = 0$

$x = -7, -1$

2

20. $x^2 + 7x = 18$

$x^2 + 7x - 18 = 0$

$(x + 9)(x - 2) = 0$

$x = -9, +2$

2

⑪

Early finishers, spicy

21. Complete the construction of a line perpendicular to line l through the point P. Show the construction marks, but make no extra lines.
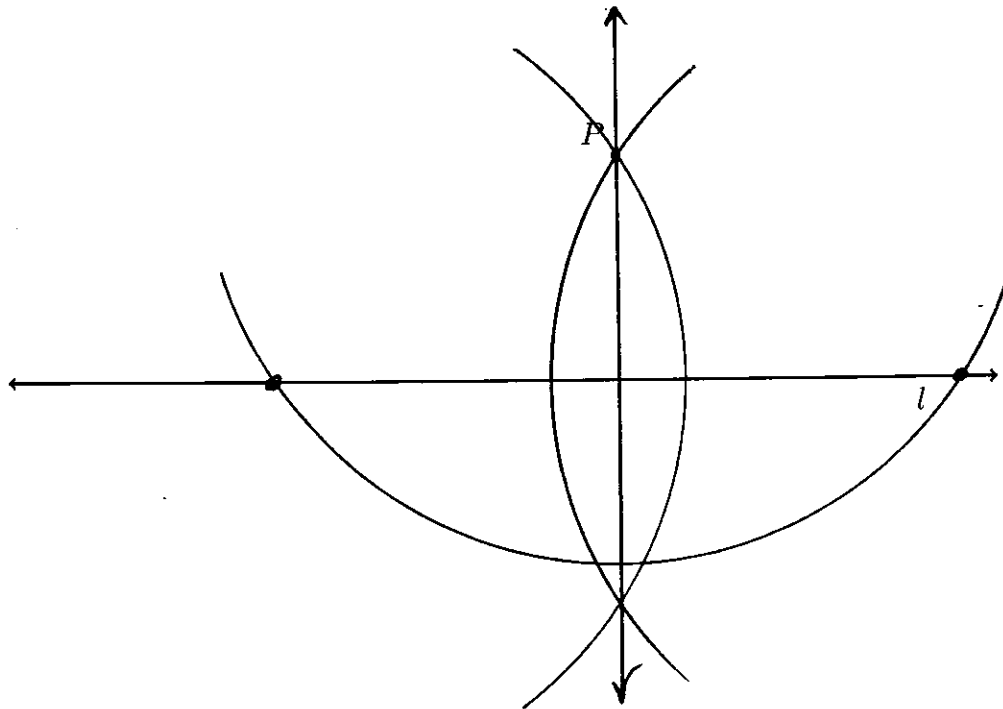
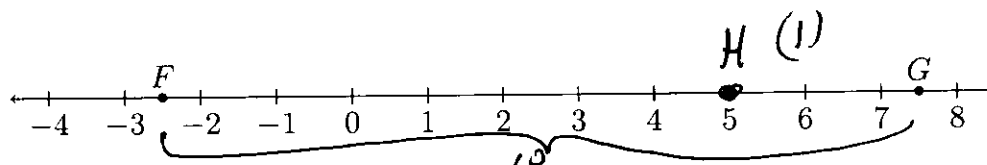22. The perimeter of a square is 52 cm. Find the area of the square.

$$P = 4s = 52$$
$$S = 13$$
$$A = 13^2$$
$$= 169$$

23. Given $\overleftrightarrow{FG}$ as shown on the number line, with $F = -2.5$ and $G = 7.5$.
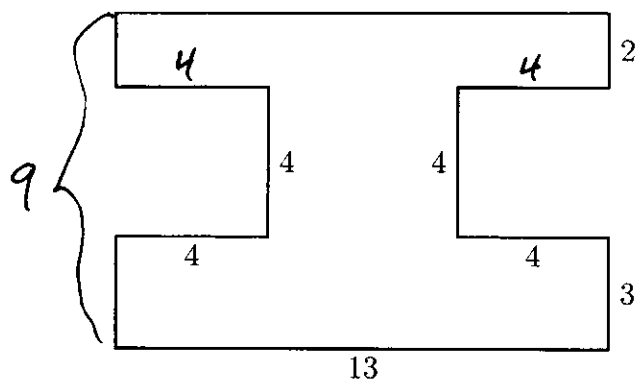
The point H is $\frac{3}{4}$ of the way from F to G. Find the value of H, and mark and label it on the numberline $\overleftrightarrow{FG}$.

$$H = F + \frac{3}{4}(G - F)$$
$$= -2.5 + \frac{3}{4}(7.5 - (-2.5))$$
$$= 5$$

check
$$H = G - \frac{1}{4}(G - F)$$
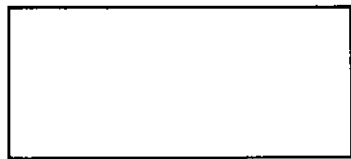$$= 7.5 - (\frac{1}{4})(7.5 - (-2.5))$$
$$= 5 \quad \checkmark$$

|

24. The shape shown below is composed of straight lines and right angles, with some lengths as marked. Find the area of the figure. Show your work.

$$A = 9 \times 13 - 4 \times 4 - 4 \times 4$$
$$= 117 - 16 - 16$$
$$= 85$$

|

2

25. The length of the given rectangle is 12 more than the width. Its area is 64. Find the length and width of the rectangle using an algebraic method.

(the drawing is not to scale)

x

$A = x(x+12) = 64$

$x^2 + 12x = 64$

$x^2 + 12x - 64 = 0$

$(x + 16)(x - 4) = 0$

$x = -16, +4$

$x = 4$

$x + 12 = 16$

4, 16

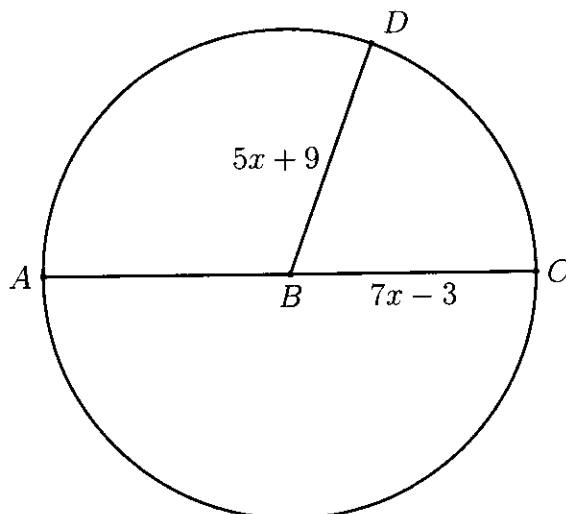2

disregard negative length

check

$4 \times 16 = 64$ ✓

$x + 12$

26. The circle with center B is shown below with diameter $\overline{AC}$ and radius $\overline{BD}$. Given $BC = 7x - 3$ and $BD = 5x + 9$. Find the diameter of the circle.

D

$5x + 9$

A   B $7x - 3$ C

a circle's radii are congruent

$5x + 9 = 7x - 3$

$12 = 2x$

$x = 6$

$BC = 7(6) - 3$

$= 39$

$AC = 2 \times 39 = \underline{78}$

check

$BD = 5(6) + 9$ ✓

$= 39$ ✓

1

3