

### 11.4 Homework: Mixed problems bank

1. Find the volume of a pyramid ( $V = \frac{1}{3}Bh$ ) having a height of 11.3 inches and with a square base having side lengths of 7 inches. Express your result to the *nearest cubic inch*.
2. Find the volume of a hemisphere with a radius of 30 inches, to the *nearest whole cubic inch*. (The formula for the volume of a *sphere* is  $V = \frac{4}{3}\pi r^3$ )

#### Applying density ratios

3. Find the weight of a metal block with a volume of 20 cubic inches and a density of 0.75 pounds per cubic inch.
4. A large block of ice has a volume of 45 liters. The density of ice (water) is one kilogram per liter. Find the weight of the ice.
5. A tank of gasoline holds 20 gallons. Find the cost to completely fill the tank if gasoline costs \$2.35 per gallon.
6. A bar of solid gold is in the shape of a rectangular prism having a length of 10 cm, width of 4 cm, and thickness of 1.5 cm. The density of gold is 19.3 grams per cubic cm, and its approximate market value is \$50 per gram.
  - (a) Find the weight of the bar of gold.
  - (b) Find its value in dollars.
7. A tank of gasoline holds 15 gallons. Find the cost to completely fill the tank if gasoline costs \$3.15 per gallon.
8. A stick of butter has a volume of 90 cubic centimeters. If the density of butter is 0.9 grams per cubic centimeter, find the weight of a stick of butter.
9. A large glass marble has a diameter of 3 cm. The density of glass is  $2.70 \text{ g/cm}^3$ . Find the weight of the marble.
10. A bar of solid gold is in the shape of a rectangular prism having a length of 12 cm, width of 2 cm, and thickness of 2 cm. The density of gold is 19.3 grams per cubic cm, and its approximate market value is \$50 per gram.
  - (a) Find the weight of the bar of gold.
  - (b) Find its value in dollars.

11. A cylinder is 12.3 cm tall and has a volume of 966 cubic cm. Find the area of the base of the cylinder. Express your result to the *nearest hundredth of a square centimeter*.
12. Find the volume of a pyramid ( $V = \frac{1}{3}Bh$ ) having a height of 11.3 inches and with a square base having side lengths of 7 inches. Express your result to the *nearest cubic inch*.
13. Find the volume of a hemisphere with a radius of 30 inches, to the *nearest whole cubic inch*. (The formula for the volume of a *sphere* is  $V = \frac{4}{3}\pi r^3$ )
14. Given  $R(-2, 0)$  and  $S(3, 5)$ , find the length of  $\overline{RS}$ . Simplify the radical.
15. Find the volume of a cone ( $V = \frac{1}{3}\pi r^2 h$ ) having a height of 12 inches and with a radius of 3 inches. Express your result to the *nearest cubic inch*.
16. Find the volume of a cylinder 10 inches tall with a radius of 6 inches, to the *nearest whole cubic inch*. (The formula for the volume of a *cylinder* is  $V = \frac{4}{3}\pi r^3$ )

**Model the situation with an equation. Use the formula sheet. You must start with a labeling variable. Do NOT solve!**

17. A large concrete post in the shape of a cylinder has a volume of 250 cubic feet. Its height is 12 feet. Find the radius of the base of the post.
18. A spherical cork fishing net float has a volume of 4000 cubic centimeters. Find its radius.
19. The volume of a cone having a **diameter** of 10 inches is 200 cubic inches. Find the cone's height.
20. A spherical cork fishing net float has a volume of 1700 cubic centimeters. Find its radius.
21. A large concrete post in the shape of a cylinder has a volume of 190 cubic feet. Its height is 11 feet. Find the radius of the base of the post.
22. The volume of a cone having a **diameter** of 9 inches is 48 cubic inches. Find the cone's height.

### **Applying density ratios**

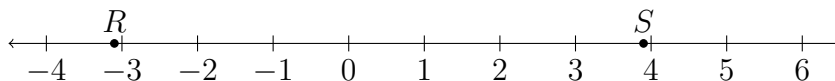
23. A tank of gasoline holds 17 gallons. Find the cost to completely fill the tank if gasoline costs \$4.35 per gallon.

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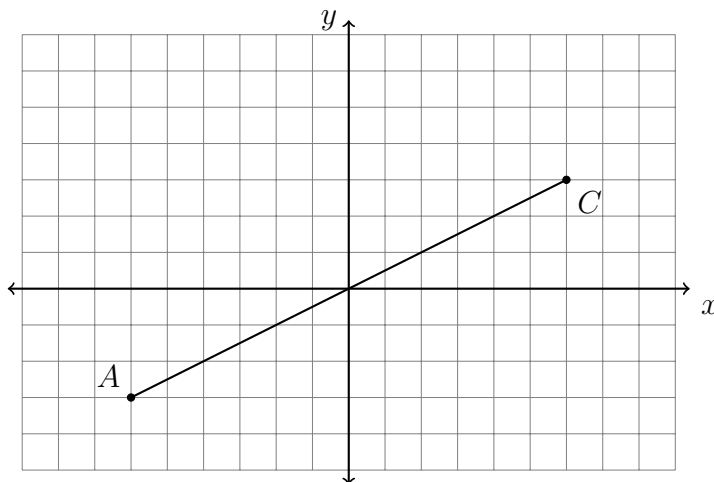
24. A tub of lard has a volume of 100 cubic centimeters. If the density of lard is 0.85 grams per cubic centimeter, find the weight of the tub of lard.
25. A large glass marble has a diameter of 2.8 cm. The density of glass is  $3.10 \text{ g/cm}^3$ . Find the weight of the marble.
26. A bar of solid gold is in the shape of a rectangular prism having a length of 18 cm, width of 8 cm, and thickness of 2.25 cm. The density of gold is 19.3 grams per cubic cm, and its approximate market value is \$55 per gram.
  - (a) Find the weight of the bar of gold.
  - (b) Find its value in dollars.

**Number line**

27. Given  $\overleftrightarrow{RS}$  as shown on the number line, with  $R = -3.1$  and  $S = 3.9$ .

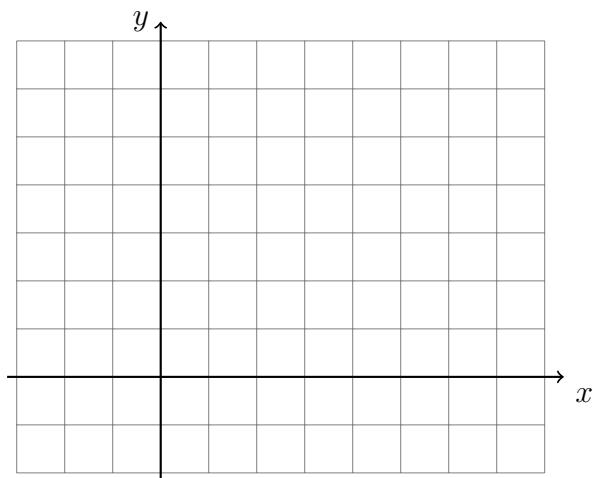


- (a) What is the exact distance on the number line between the points  $R$  and  $S$ ?
- (b) The point  $T$  bisects  $\overleftrightarrow{RS}$ . Find the value of  $T$ , and mark and label it on the numberline  $\overleftrightarrow{RS}$  shown above.
28. In the diagram below,  $\overline{AC}$  has endpoints with coordinates  $A(-6, -3)$  and  $C(6, 3)$ .



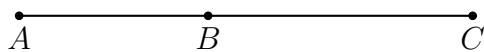
- If  $B$  is a point on  $\overline{AC}$  and  $AB:BC = 1:3$ , what are the coordinates of  $B$ ?
29. On the graph below, draw  $\overline{AB}$ , with  $A(5, 3)$  and  $B(-1, -3)$ , labeling the end points. Determine and state the coordinates of the midpoint  $M$  of  $\overline{AB}$  and mark and label it on the graph.

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30. Given  $\overline{ABC}$ ,  $AC = 18$ , and the point  $B$  partitions  $\overline{AC}$  in a ratio of 2:7.

Find  $AB$ .



### Composition circle area and perimeter

*Unless otherwise instructed, find an exact answer, in terms of  $\pi$  or using radicals if necessary.*

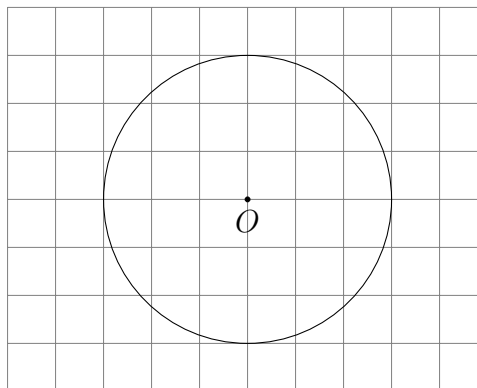
31. Use the formulas for the area and circumference of circles:

$$A = \pi r^2$$

$$C = \pi D = 2\pi r$$

32. Given the circle centered at  $O$  with radius  $r = 3$ . Leave an exact answer, in terms of  $\pi$  if necessary.

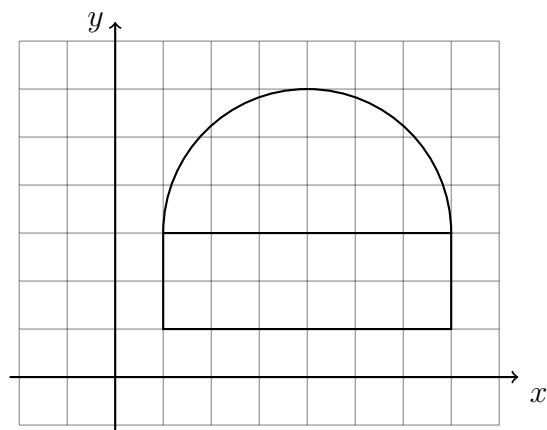
(a) Find the circumference of circle  $O$ .



(b) Find the area of the circle.

33. Find the radius of a circle having an area of  $25\pi$ .

34. Find the area of the shape shown below composed of a rectangle and circular cap. Leave your answer as an exact value in terms of  $\pi$ .

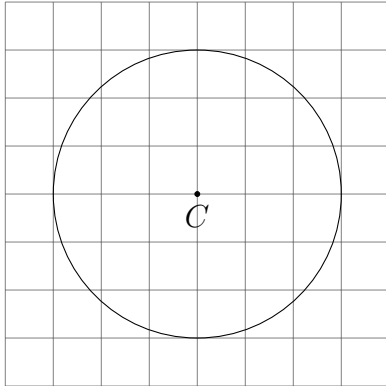


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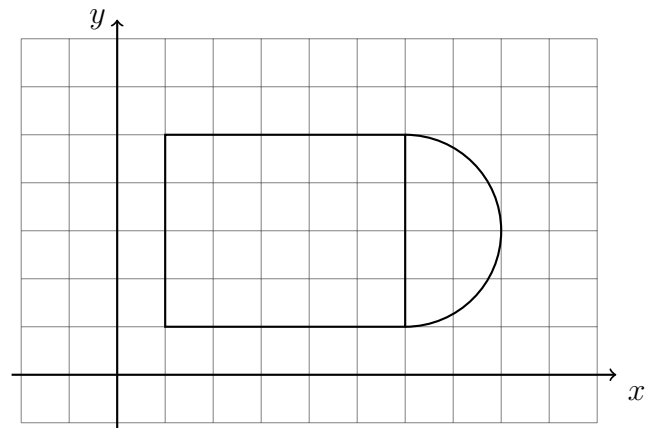
35. Given the circle  $C$  with circumference  $10\pi$ .

(a) Write down the formula for the circumference of a circle and solve for the radius yielding a circumference of  $6\pi$ .

(b) Find the area of the circle.



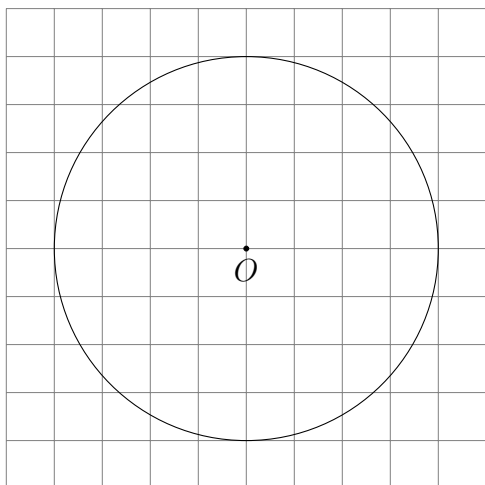
36. Find the area of the shape shown below composed of a rectangle and a semi-circle.



37. Given the circle  $O$  with circumference  $8\pi$ .

(a) Write down the formula for the circumference of a circle and solve for the radius yielding a circumference of  $8\pi$ .

(b) Find the area of the circle.



38. Use the formulas for the area and circumference of circles:

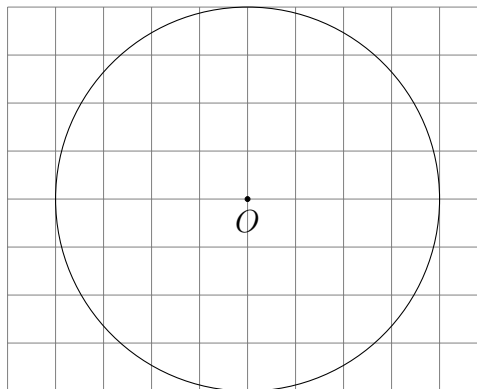
$$A = \pi r^2$$

$$C = \pi D = 2\pi r$$

39. Given the circle centered at  $O$  with radius  $r = 4$ . Leave an exact answer, in terms of  $\pi$  if necessary.

(a) Find the circumference of circle  $O$ .

(b) Find the area of the circle.

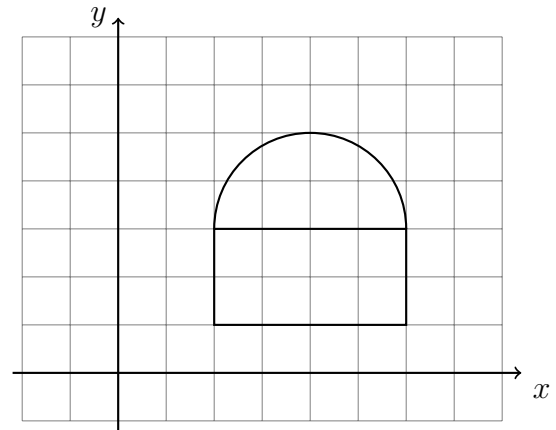


40. Find the radius of a circle having an area of  $49\pi$ .

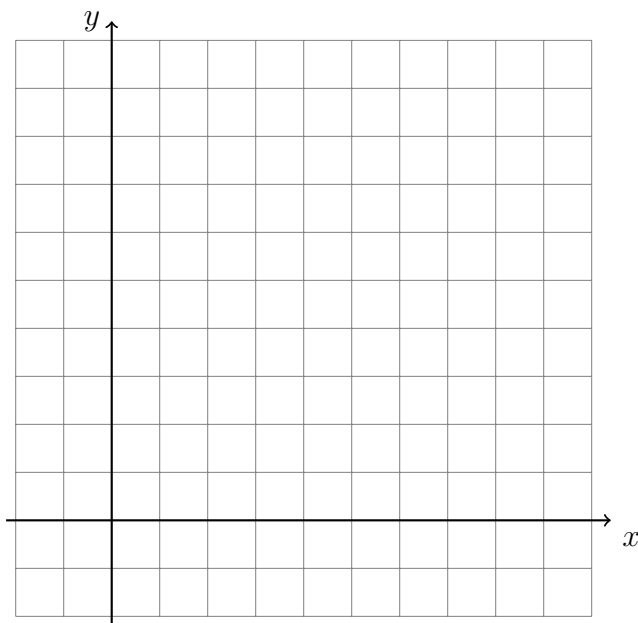
41. Find the area of the shape shown below composed of a rectangle and circular cap. Leave your answer as an exact value in terms of  $\pi$ .



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42. Given  $R(-1, 1)$  and  $S(3, 4)$ , find the length of  $\overline{RS}$ . Note:  $l = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ .
43. Given  $R(-2, 0)$  and  $S(3, 5)$ , find the length of  $\overline{RS}$ . Simplify the radical.
44. Given  $R(-3, 1)$  and  $S(5, 7)$ , find the length of  $\overline{RS}$ . Note:  $l = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ .
45. Given  $P(7, 0)$  and  $Q(3, 2)$ , find the length of  $\overline{PQ}$ . Simplify the radical.
46. On the graph, draw polygon ABCDEF with vertices A(1, 1), B(1, 4), C(3, 4), D(3, 7), E(8, 7), and F(8, 1). Find the perimeter and the area of the polygon.

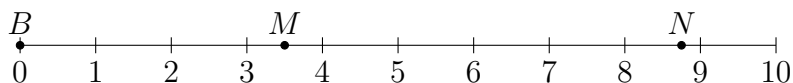


**Estimating and measuring**

47. The point  $P$  falls  $A(0)$  and  $B(10)$  on the numberline  $\overleftrightarrow{AB}$  as shown below.

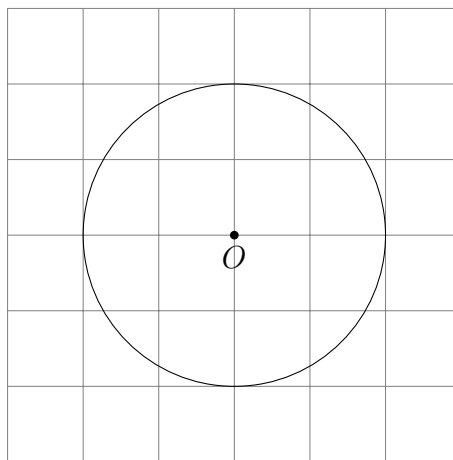


- (a) Estimate the value of  $P$  without using any tools.
- (b) Find the position of  $P$  as accurately as you can with a ruler.
48. The distance from  $B$  on the line is scaled so that each centimeter represents one foot.



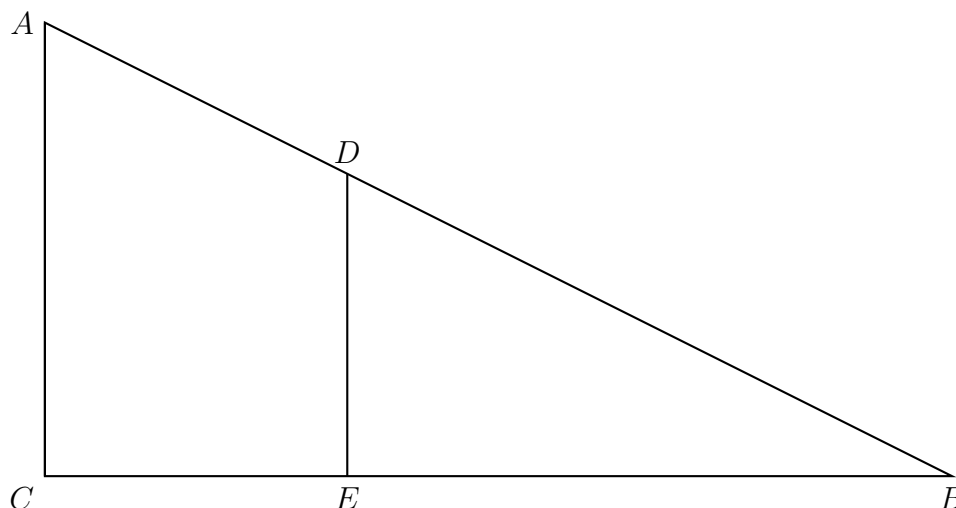
- (a) Estimate the distance of  $M$  from  $B$  in feet and inches (by eye).
- (b) Using a ruler, find the distance between  $M$  and  $N$  in feet and inches.
49. Given the circle  $O$  with diameter  $D = 4$ .

- (a) Estimate the area by counting the squares in the grid.
- (b) Calculate the area.
- (c) Quantify the error in your estimate as a percentage.

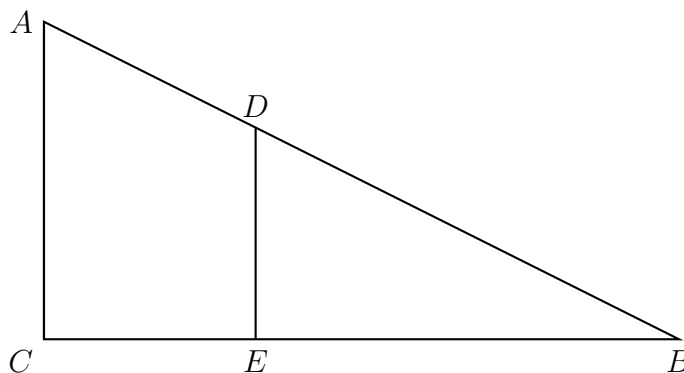


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50. The diagram below is drawn to scale. Given that  $BE = 10$  and  $DE = 5$ , find  $AC$ .

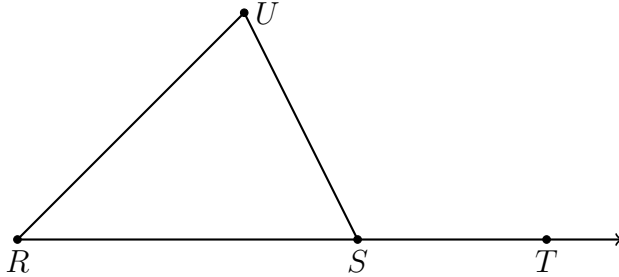


51. In right triangle  $ABC$  shown below, point  $D$  is on  $\overline{AB}$  and point  $E$  is on  $\overline{BC}$  such that  $\overline{AC} \parallel \overline{DE}$ . Given  $BD = 10$ ,  $BC = 12$ , and  $EC = 4$ .

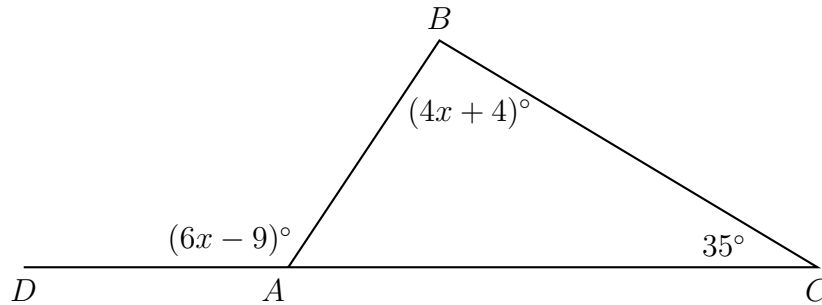


- (a) Find the length of  $\overline{BE}$ .
- (b) Find the scale factor,  $k$ , dilating  $\triangle DBE \rightarrow \triangle ABC$ , centered at  $B$ .
- (c) Find the area of  $\triangle ABC$ .
- (d) Find the area of  $\triangle DEB$ .
- (e) Find the ratio of the areas of the two triangles.

52. Given  $m\angle R = 45$  and  $m\angle UST = 110$ . Find  $m\angle U$ .



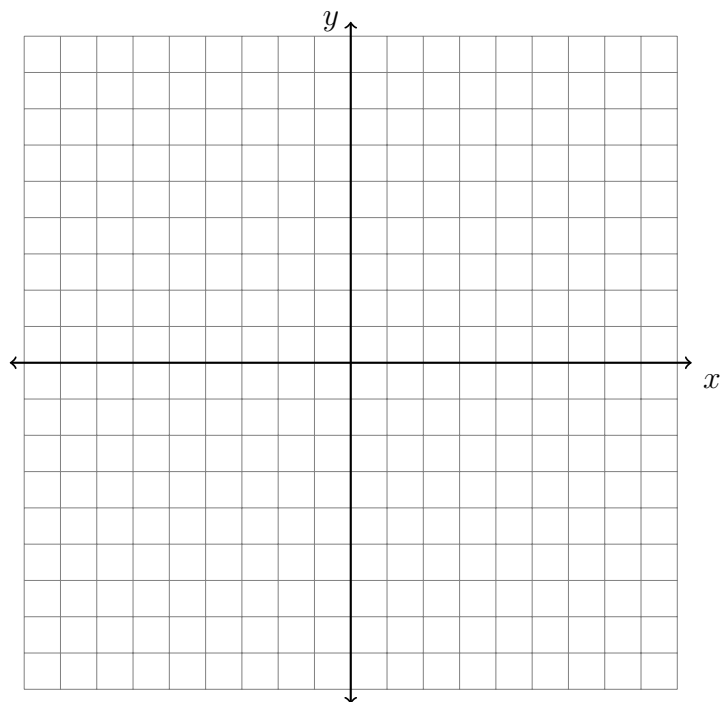
53. In  $\triangle ABC$  shown below, side  $\overline{AC}$  is extended to point  $D$  with  $m\angle DAB = (6x - 9)^\circ$ ,  $m\angle C = 35^\circ$ , and  $m\angle B = (4x + 4)^\circ$ .



What is  $m\angle BAC$ ?

54. On the set of axes below, graph the quadrilateral  $ABCD$  having coordinates  $A(-3, -3)$ ,  $B(5, 1)$ ,  $C(6, 8)$ , and  $D(-2, 4)$ .

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Show that the midpoints of the two diagonals,  $\overline{AC}$  and  $\overline{BD}$ , are the same point.  
Prove  $ABCD$  is a parallelogram. Use the following theorem: A quadrilateral is a parallelogram if and only if its diagonals bisect each other.

Be sure to state the conclusion in your proof.