

Math Power

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Name: (First) _____ (Last) _____

School: _____ Grade: _____

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Honors Geometry

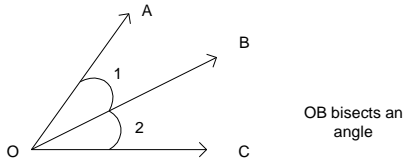
Sample

Angle Bisectors

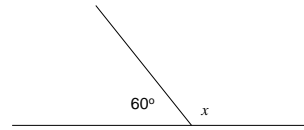
Definition: angle bisector

Angle bisector divides an angle equally.

The ray OB divides the angle $\angle AOB$ evenly into two congruent angles: $\angle 1$ and $\angle 2$, so OB is called the angle bisector of $\angle AOB$.



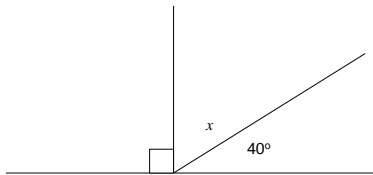
3. What should be the value for x in the figure?



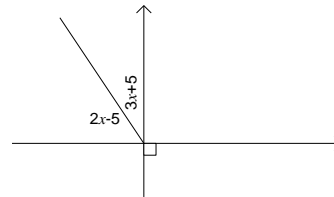
Question set [1 - 4]

Find the value of x in each of the following.

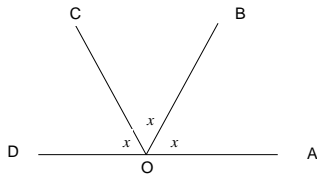
1. What is the measure of x in the figure?



4. Find the value of x .



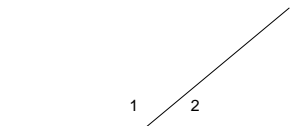
2. $\angle AOD$ is a straight angle (180°), OB and OC divide the entire angle into three congruent angles, what should be the value for x ?



Question set [5 - 10]

Conceptual and computational problems.

5. $\angle 1$ and $\angle 2$ are called _____



Honors Geometry Sample

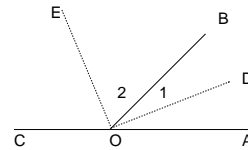
6. Two angles are _____ if they add up to be 90° .

10. Is it true that a straight angle is twice a right angle?

7. Two angles are _____ if they add up to be 180° .

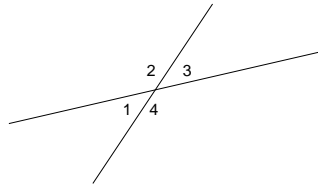
Question set [11 - 12]

$\angle AOB$ and $\angle BOC$ are linear pair. DO bisects $\angle AOB$ and EO bisects $\angle BOC$.



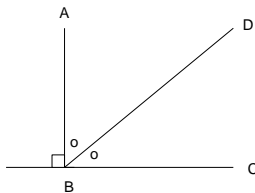
8. What angles are supplementary to $\angle 1$?

11. Given that $\angle AOB = 40^\circ$, what is the measure of $\angle 2$?



12. Prove that $\angle 1 + \angle 2 = 90^\circ$ regardless of the measure of $\angle AOB$.

9. If BD bisects $\angle ABC$, what is the measure of $\angle ABD$?



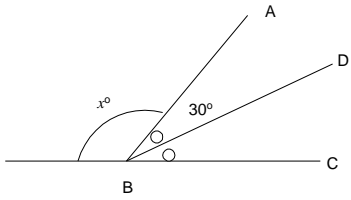
Question set [13 - 17]

Computational problems.

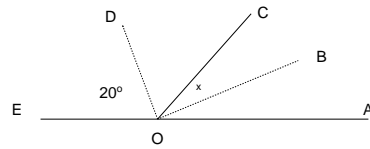
Honors Geometry

Sample

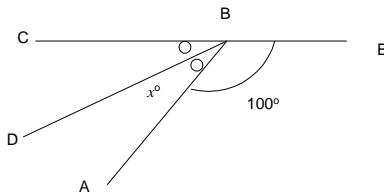
13. BD bisects $\angle ABC$. If $\angle ABD = 30^\circ$, find the value for x .



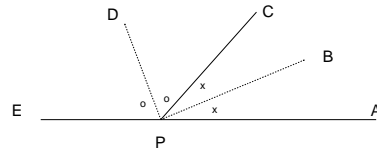
16. $\angle COE$ is bisected by OD and $\angle AOC$ is bisected by OB . Find the value for x .



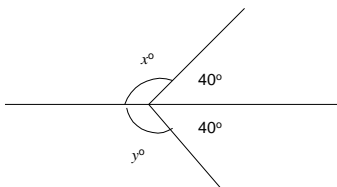
14. $\angle ABC$ is bisected by BD in the figure. If $\angle ABE = 100^\circ$, find the value for x .



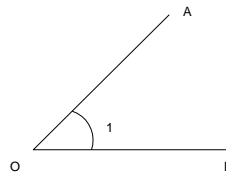
17. P is a point on AE . BP bisects $\angle APC$. DP bisects $\angle CPE$. Find the measure of $\angle DPB$.



15. As in the following figure, is it true that $x = y$?



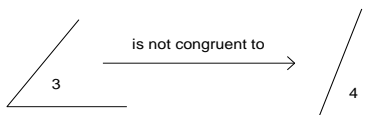
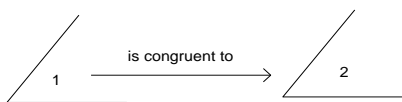
Name of an angle:



An angle is formed by one vertex and two sides connected by the vertex. As in the figure, the angle can be expressed as $\angle AOB$ or $\angle 1$ in short.

Definition: congruent angle

Congruent angles are equal in measure.



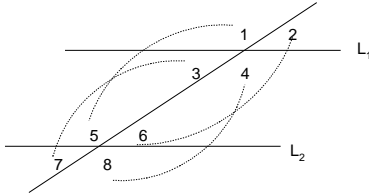
When two angles $\angle 1$ and $\angle 2$ are measured to be the same, we called them congruent angles, or we say $\angle 1$ is congruent to $\angle 2$.

Honors Geometry Sample

Parallel Lines and Angles

Definition: corresponding angles

Two lines L_1 and L_2 (not necessarily parallel) are cut by a transversal. Get familiar with the following terms.



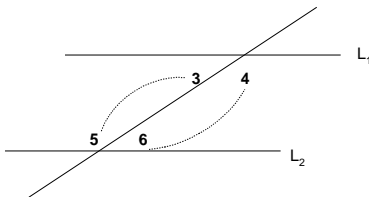
There are four such pairs: $(\angle 1, \angle 5)$, $(\angle 3, \angle 7)$, $(\angle 2, \angle 6)$, $(\angle 4, \angle 8)$.

THEOREM A

[Corresponding Angles Postulate]

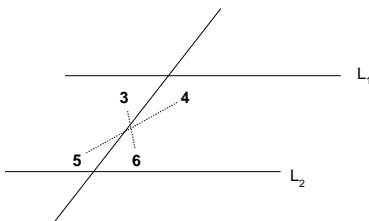
If L_1 and L_2 are parallel and cut by a transversal then corresponding angles are congruent.

Consecutive interior angles:



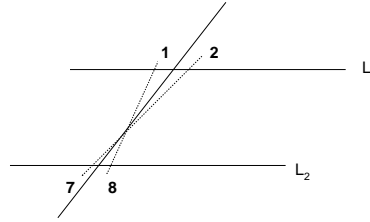
There are two such pairs: $(\angle 3, \angle 5)$, $(\angle 4, \angle 6)$.

Alternate interior angles:



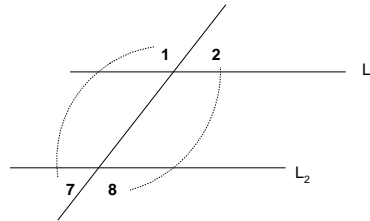
There are two such pairs: $(\angle 3, \angle 6)$ and $(\angle 4, \angle 5)$.

Alternate exterior angles:



There are two such pairs: $(\angle 2, \angle 7)$ and $(\angle 1, \angle 8)$.

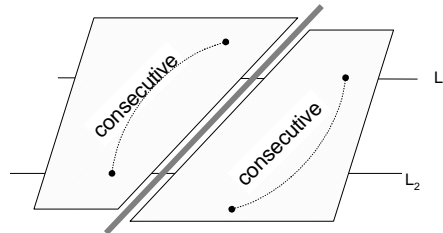
Consecutive exterior angles:



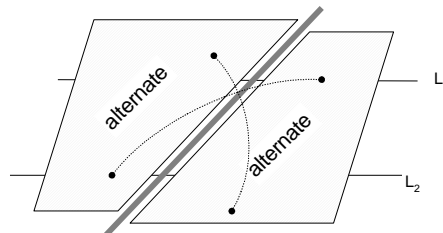
There are two such pairs: $(\angle 1, \angle 7)$ and $(\angle 2, \angle 8)$.

Consecutive and alternate angles

The term consecutive pair refers to both angles falling on the same side of the transversal.



The term alternate pair refers to either of the angle falling at the opposite side of the transversal.



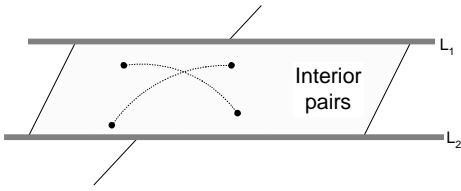
Interior and exterior angles

The term interior pair refers to both angles

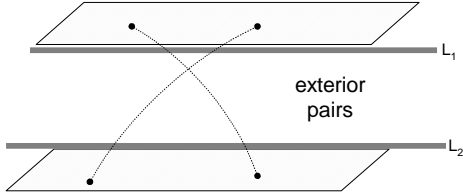
Honors Geometry

Sample

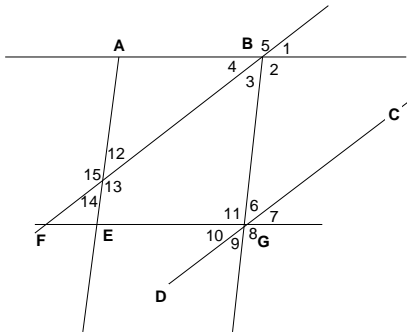
falling in the interior strip formed by L_1 and L_2 .



The term exterior pair refers to both angles falling in the exterior strip formed by L_1 and L_2 .

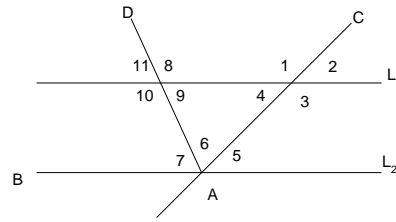


18. In each of the following problems use the information to name the segments that must be parallel. If there is no such segment, write none.

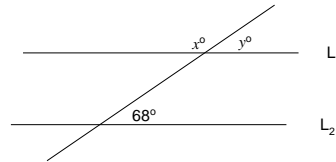


Given	Parallel segments	Reason
a) $\angle 2 = \angle 8$	AB//EG	corr. angles
b) $\angle 1 + \angle 2 = \angle 7 + \angle 8$		
c) $\angle 3 + \angle 13 = 180^\circ$		
d) $\angle 8 = \angle 15$		
e) $\angle 3 = \angle 14$		
f) $\angle 3 + \angle 10 + \angle 11 = 180^\circ$		
g) $\angle 1 + \angle 11 = 180^\circ$		
h) $\angle 2 = \angle 11$		

19. In the figure, $L_1 // L_2$. DA is the angle bisector of $\angle BAC$. $\angle 1 = 100^\circ$. Find the measure of the remaining angles (from 2 to 11).



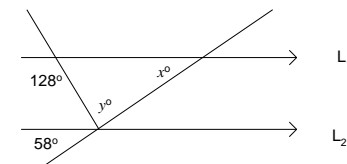
20. Find the values of x and y .



Question set [21 - 26]

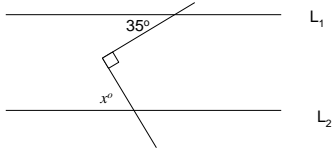
Given that $L_1 // L_2$.

21. Find the values of x and y .

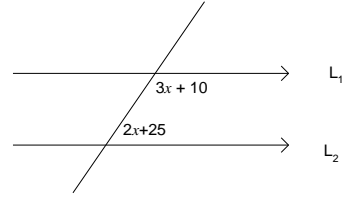


Honors Geometry Sample

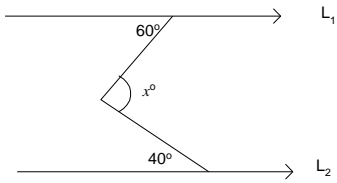
22. Find the value of x .



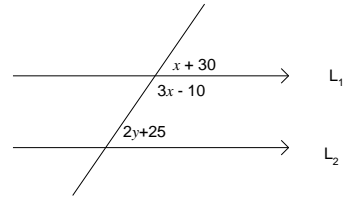
25. Find the value of x .



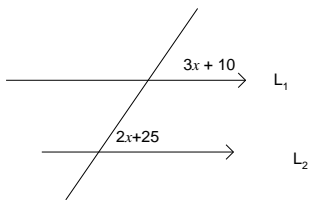
23. Find the value of x .



26. Find the value of x and y .

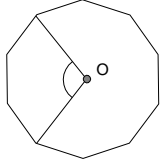


24. Find the value of x .



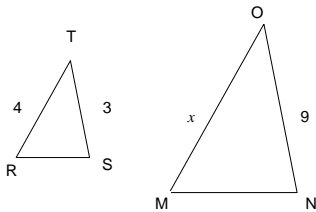
Assessment Test

27. If the figure below is a regular decagon with a center at Q, what is the measure of the indicated angle?



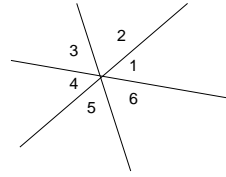
- (A) 45°
- (B) 80°
- (C) 90°
- (D) 108°

28. $\triangle RST$ and $\triangle MNO$ are similar. What is the length of line segment MO?



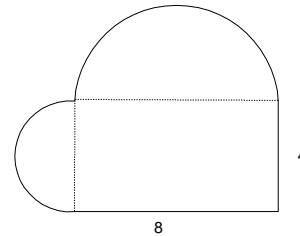
- (A) 12 cm
- (B) 15 cm
- (C) 20 cm
- (D) 32 cm

29. In the diagram, three lines intersect at point O. Which of the following are NOT adjacent angles?



- (A) $\angle 1$ and $\angle 6$
- (B) $\angle 1$ and $\angle 4$
- (C) $\angle 4$ and $\angle 5$
- (D) $\angle 2$ and $\angle 3$

30. Find the perimeter of the shape below.



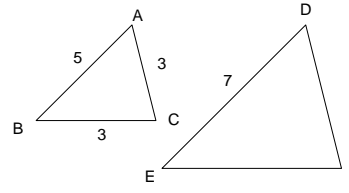
31. A triangle has sides that are consecutive even integers. The perimeter of the triangle is 24 inches. What is the length of the shortest side?
- (A) 10 inches
 - (B) 8 inches
 - (C) 6 inches
 - (D) 4 inches

Honors Geometry

Sample

32. If the area of a circle is 16π square inches, what is the perimeter?
 (A) 2π inches
 (B) 4π inches
 (C) 8π inches
 (D) 16π inches

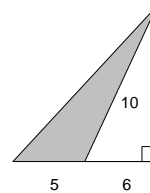
36. If the two triangles in the diagram are similar, with $\angle A = \angle D$, $\angle B = \angle E$, what is the perimeter of $\triangle DEF$



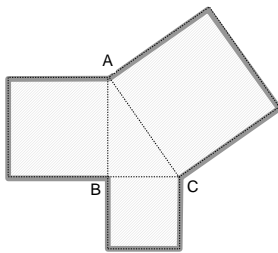
33. What is the length of one side of a square rug whose perimeter is 60 feet?
 (A) 14.5 feet
 (B) 15 feet
 (C) 15.5 feet
 (D) 16 feet

34. What is the perimeter of a pentagon with three sides of 3 inches, and the remaining sides 5 inches long?
 (A) 19 inches
 (B) 9 inches
 (C) 14 inches
 (D) 12 inches

37. What is the area of the shaded triangle below?

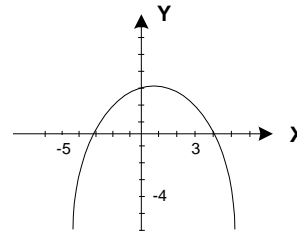


35. Grow three squares along the sides of $\triangle ABC$ as the figure below. If the perimeter of the $\triangle ABC$ is 12, what is the perimeter 9-sided polygon?



- (A) 20 square units
 (B) 25 square units
 (C) 44 square units
 (D) 46 square units

38. Which equation is represented by the parabola below?



- (A) $y = \frac{1}{4}x^2 + \frac{1}{4}x + 3$
 (B) $y = -\frac{1}{4}x^2 + \frac{1}{4}x + 3$
 (C) $y = \frac{1}{4}x^2 - \frac{1}{4}x - 3$
 (D) $y = -\frac{1}{4}x^2 - \frac{1}{4}x + 3$

Honors Geometry

Sample

39. $\triangle ABC \sim \triangle DEF$ in the following figure. The lengths of four sides are represented by a , b , c , and d .

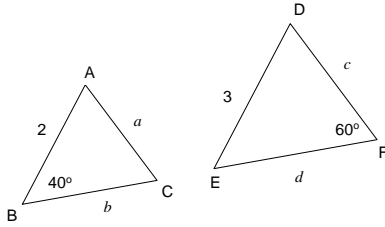
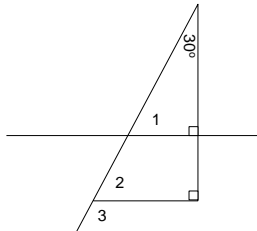


Figure not drawn to scale

Which of the following has the greatest value?

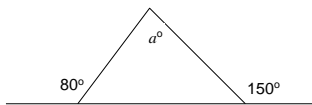
- (A) a
- (B) b
- (C) c
- (D) d

40. In the diagram below, what is the measure of $\angle 3$?



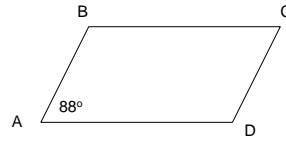
- (A) 30°
- (B) 60°
- (C) 120°
- (D) 140°

41. What is the value of a in the following diagram?



- (A) 70°
- (B) 60°
- (C) 50°
- (D) 40°

42. What is the measure of $\angle ABC$ if ABCD is a parallelogram, and the measure of $\angle BAD$ is 88° ?



- (A) 88°
- (B) 90°
- (C) 92°
- (D) 102°

43. One base angle of an isosceles triangle is 70° . What is the vertex angle?

- (A) 130°
- (B) 90°
- (C) 70°
- (D) 40°

44. A circular fan is encased in a square guard. If one side of the guard is 12 inches, at what blade circumference will the fan just hit the guard?

- (A) 6 inches
- (B) 12 inches
- (C) 6π inches
- (D) 12π inches

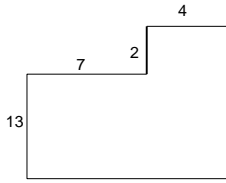
45. If the circumference of a circle is half the area, what is the radius of the circle?

- (A) 3
- (B) 2
- (C) 4
- (D) 8

46. What is the circumference of a circle with a diameter of 5 inches?
- (A) 2.5π inches
 - (B) 5π inches
 - (C) 6.25π inches
 - (D) 25π inches

Assessment Test

47. What is the area of the following diagram?



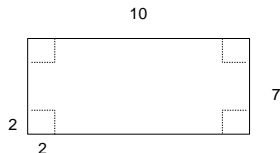
- (A) 141
- (B) 151
- (C) 161
- (D) 181

48. What is the volume of a pyramid with a rectangular base 5 feet by 3 feet and a height of 8 feet?

Hint: $V = \frac{1}{3}(\text{base area}) \times (\text{height})$.

- (A) 16 cubic feet
- (B) 30 cubic feet
- (C) 40 cubic feet
- (D) 80 cubic feet

49. Georgio is making a box. He starts with a 10-by-7 rectangle, then cuts 2-by-2 squares out of each corner. To finish, he folds each side up to make the box. What is the box's volume?



- (A) 36
- (B) 70
- (C) 72
- (D) 140

50. In order to protect her new VW Bug, Maria needs to build a new garage. The concrete door needs to be 62.1 square feet and is 9.2 feet long. How wide does it need to be?

- (A) 7.25 feet
- (B) 5.5 feet
- (C) 6.75 feet
- (D) 8.25 feet

51. All of the rooms on the top floor of a government building are rectangular, with 8-foot ceilings. One room is 9 feet wide by 11 feet long. What is the combined area of the four walls, including doors and windows?

- (A) 99 square feet
- (B) 160 square feet
- (C) 320 square feet
- (D) 72 square feet

52. A rectangular tumbling mat for a gym class is 5 feet wide and 7 feet long. What is the area of the mat?

- (A) 12 square feet
- (B) 22 square feet
- (C) 24 square feet
- (D) 35 square feet

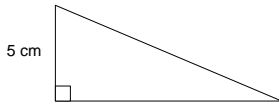
53. A farmer is building a rectangular pen on the side of his barn, which is 100 feet long. He has 500 feet of fence and is using the side of the barn as the fourth side of the fence. What will be the area of the pen?

- (A) 10,000 square feet
- (B) 20,000 square feet
- (C) 30,000 square feet
- (D) 50,000 square feet

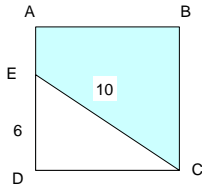
Honors Geometry Sample

54. Louise wants to wallpaper a room. It has one window that measures 3 feet by 4 feet, and one door that measures 3 feet by 7 feet. The room is 12 feet by 12 feet, and is 10 feet tall. If only the walls are to be covered, and rolls of wallpaper are 100 square feet, what is the minimum number of rolls that she will need?
- (A) 4 rolls
(B) 5 rolls
(C) 6 rolls
(D) 7 rolls

55. The perimeter of the following triangle is 30 cm. What is the area of the triangle?



- (A) 15
(B) 20
(C) 30
(D) 32
56. ABCD is a square. The length of EC is 10. What is the length of AC?



57. A hospital waiting room is 8 feet wide and 10 feet long. What is the area of the waiting room?
- (A) 18 square feet
(B) 40 square feet
(C) 60 square feet
(D) 80 square feet
58. The length of a rectangle is equal to 4 inches more than twice the width. Three times the length plus two times the width is equal to 28 inches. What is the area of the rectangle?
- (A) 8 square inches
(B) 16 square inches
(C) 24 square inches
(D) 28 square inches

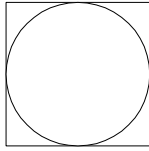
59. A rectangular box has a square base with an area of 9 square feet. If the volume of the box is 36 cubic feet, what is the length of the longest object that can fit in the box?
- (A) 3 feet
(B) 5 feet
(C) 5.8 feet
(D) 17 feet

60. Dennis Sorensen is buying land on which he plans to build a cabin. He wants 200 feet in road frontage and a lot 500 feet deep. If the asking price is \$9,000 an acre for the land, how much will Dennis pay for his lot? (1 acre = 43,560 sq. ft.)
- (A) \$10,000
(B) \$20,661
(C) \$22,956
(D) \$24,104

Honors Geometry

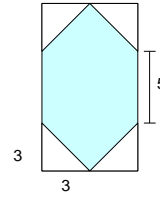
Sample

61. In the following diagram, a circle of area 100π square inches is inscribed in a square. What is the length of each side?



- (A) 10 inches
- (B) 20 inches
- (C) 100 inches
- (D) 400 inches

64. What is the area of the shaded figure inside the rectangle?

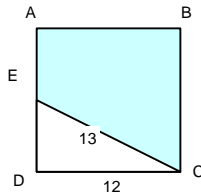


- (A) 48
- (B) 54
- (C) 60
- (D) 72

62. Gilda is making a quilt. She wants a quilt that is 30 square feet. She has collected fabric squares that are 6 inches by 6 inches. How many squares will she need?
- (A) 60 squares
 - (B) 90 squares
 - (C) 100 squares
 - (D) 120 squares

65. Ahmed has a canvas frame that is 25 inches long and 18 inches wide. He buys a canvas that is 3 inches longer on each side. What is the area of the canvas?
- (A) 450 square inches
 - (B) 744 square inches
 - (C) 588 square inches
 - (D) 872 square inches

63. ABCD is a square. What is the area of the trapezoid ABCE?



- (A) 76
- (B) 94
- (C) 114
- (D) 152

66. Prisoner Jones escaped a short time ago. On foot, he has not gotten far, and is believed to be within a 3-mile radius of the prison. What is the approximate area, in square miles, of the area in which the prisoner is hiding?
- (A) 28 square miles
 - (B) 30 square miles
 - (C) 9 square miles
 - (D) 10 square miles

Answer Key

Angle Bisectors

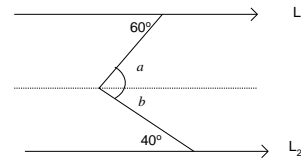
- $x = 50^\circ$
 $x + 40^\circ = 90^\circ \Rightarrow x = 50^\circ$
- $x = 60^\circ$ since $180^\circ \div 3 = 60^\circ$.
- $x = 120^\circ$
- $2x - 5 + 3x + 5 = 90^\circ$
 $5x = 90^\circ$
 $x = 18^\circ$
- Linear pair
- complementary
- supplementary
- $\angle 2$ and $\angle 4$ are supplementary to $\angle 1$
- 45°
- Yes. Straight angle has 180° and a right angle is 90° .
- $\angle AOC = 180^\circ - 40^\circ = 140^\circ$
 $\angle 2 = \frac{1}{2}\angle AOC = \frac{1}{2}(140^\circ) = 70^\circ$
- $\angle AOB + \angle BOC = 180^\circ$ (linear pair)
 $\angle 1 = \frac{1}{2}\angle AOB$ (bisector)
 $\angle 2 = \frac{1}{2}\angle BOC$ (bisector)
 $\angle 1 + \angle 2 = \frac{1}{2}(\angle AOB + \angle BOC) = 90^\circ$
- $x = 180^\circ - 2(30^\circ) = 120^\circ$
- $\angle CBA = 80^\circ$, therefore, $x = \frac{1}{2}(80) = 40$.
- Yes, since $x = y = 140^\circ$.
- $\angle COE = 40^\circ$. $\angle AOC = 140^\circ$. Thus, $x = \frac{1}{2}(140) = 70$.
- 90°

Parallel Lines and Angles

18. The answer is listed in the following table.

Given	Parallel segments	Reason
a) $\angle 2 = \angle 8$	AB//EG	corr. angles
b) $\angle 1 + \angle 2 = \angle 7 + \angle 8$	BF//CD	corr. angles.
c) $\angle 3 + \angle 13 = 180^\circ$	AE//BG	consec. int.
d) $\angle 8 = \angle 15$	None	
e) $\angle 3 = \angle 14$	AE//BG	corr. angles
f) $\angle 3 + \angle 10 + \angle 11 = 180^\circ$	BF//CD	consec. int.
g) $\angle 1 + \angle 11 = 180^\circ$	None	
h) $\angle 2 = \angle 11$	AB//EG	alt. int. angles

- $\angle 1 = \angle 3 = 100^\circ$
 $\angle 2 = \angle 4 = 80^\circ$
 $\angle 2 = \angle 5 = 80^\circ$
 $\angle 6 = \angle 7 = 50^\circ$
 $\angle 9 = \angle 11 = 50^\circ (= \angle 7)$
 $\angle 8 = \angle 10 = 130^\circ$
- $y = 68$ (corr. angles postulate)
 $x = 112^\circ$ (linear pair)
- $x = 58^\circ$ (corresponding angle) and $y = 70^\circ$.
- 55°
 $x + 35 = 90^\circ$. Thus, $x = 55^\circ$.
- 100°
 $a = 60$ (alt. int. angle)
 $b = 40$ (alt. int. angle)
 $x = a + b = 100$



- 15°
 $3x + 10 = 2x + 25$ (corresponding angle)
 $x = 15$

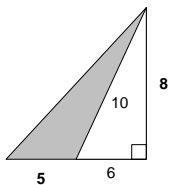
Honors Geometry Sample

25. 29°
 $3x + 10 + 2x + 25 = 180^\circ$ (consec. int. angle)
 $5x = 145$
 $x = 29$

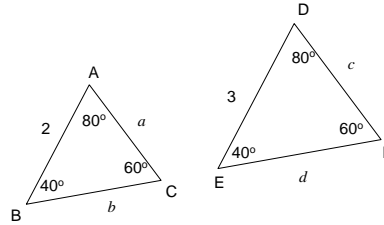
26. $x=40, y=22.5$
 $x + 30 + 3x - 10 = 180^\circ$ (linear pair)
 $4x + 20 = 180^\circ$
 $4x = 160^\circ$
 $x = 40^\circ$
 $x + 30^\circ = 2y + 25^\circ$ (corr. angles postulate)
 $70^\circ = 2y + 25^\circ$
 $2y = 45^\circ$
 $y = 22.5^\circ$

Assessment Test

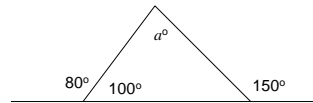
27. D
 28. A
 29. B
 30. $8 + 4 + 4\pi + 2\pi = 12 + 6\pi$
 31. C
 32. C
 33. B
 34. A
 35. 36
 36. 15.4
 The perimeter of $\triangle ABC$ is $3+3+5 = 11$.
 Since $DE = 7 = 1.4 \times AB$, the perimeter of $\triangle DEF = 1.4 \times 11 = 15.4$
 37. A
 The height is 8 and the base is 5, the area is $\frac{1}{2}(5 \times 8) = 20$



38. B
 $y = -\frac{1}{4}(x + 3)(x - 4) = -\frac{1}{4}x^2 + \frac{1}{4}x + 3$
 39. D
 Note that we have $b > a, d > c$, and $d = 1.5b$
 Therefore, d is the largest one.



40. C
 41. C
 $a + 100 = 150 \Rightarrow a = 50$



42. C
 43. D
 44. D
 45. C
 46. B

Assessment Test

47. B
 $13 \times 11 + 2 \times 4 = 151$
 48. C
 $\frac{1}{3} \times (3 \times 5) \times 8 = 40$
 49. A
 The height of the box is 2, the length of the base is $10 - 2 \times 2 = 6$, the width is $7 - 2 \times 2 = 3$, the base area is $3 \times 6 = 18$. The volume is $2 \times 3 \times 6 = 36$
 50. C

Honors Geometry Sample

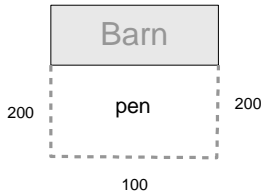
51. C

52. D

53. B

$$\frac{1}{2}(500 - 100) = 200$$

$$200 \times 100 = 20,000$$



54. B

55. C

Let x be the base, the hypotenuse will be $30 - 5 - x = 25 - x$. Using Pythagorean theorem.

$$x^2 + 5^2 = (25 - x)^2$$

$$x^2 + 25 = 625 - 50x + x^2$$

$$50x = 600$$

$$x = 12$$

$$\text{The area is } \frac{1}{2} \times 12 \times 5 = 30$$

56. $8\sqrt{2}$

$$DC = 8, AC = 8\sqrt{2}$$

57. D

58. B

Let x = the width and $2x + 4$ = the length. We have

$$3(\text{length}) + 2(\text{width}) = 28$$

$$3(2x + 4) + 2x = 28$$

$$8x + 12 = 28$$

$$8x = 16$$

$$x = 2$$

$$\text{The area} = 2 \times 8 = 16 \text{ in}^2.$$

59. C

60. B

$$200 \times 500 = 100,000$$

$$100,000 \div 43,560 \times 9,000 = 20,661$$

61. B

$100\pi = 10^2\pi$, the radius is 10, each of the square is 20.

62. D

63. C

$DE = 5$, $AE = 7$, $BC = 12$, the area of the trapezoid = $\frac{1}{2}(7 + 12) \times 12 = 114$.

64. A

The area of the rectangle is $11 \times 6 = 66$.

Each of the four corner triangles has an area of $\frac{1}{2} \times 3 \times 3 = 4.5$. The shaded area =

$$66 - 4 \times 4.5 = 48.$$

65. B

66. A