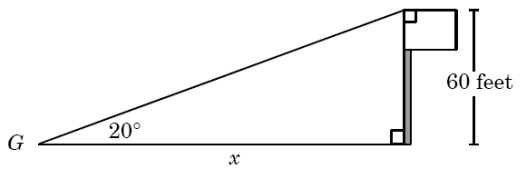
1. The angle of elevation from point *G* on the ground to the top of a flagpole is 20°. The height of the flagpole is 60feet.



Which equation could find the distance from point *G* to the base of the flagpole?

A $\sin 20° = \frac{x}{60}$

B $\sin 20° = \frac{60}{x}$

C $\tan 20° = \frac{60}{x}$

D $\tan 20° = \frac{x}{60}$

2. A mountain climber stands on level ground 300 m from the base of a cliff. The angle of elevation to the top of the cliff is 58°. What is the ***approximate*** height of the cliff?

A 187 m

B 354 m

C 480 m

D 566 m

3. A 20-foot ladder is leaning against a wall. The foot of the ladder is 7 feet from the base of the wall. What is the ***approximate*** measure of the angle the ladder forms with the ground?

A 19.3°

B 20.5°

C 69.5°

D 70.7°

4. A ladder is leaning against the side of a building. The ladder is 30 feet long, and the angle between the ladder and the building is 15°. ***About*** how far is the foot of the ladder from the building?

A 7.76 feet

B 8.04 feet

C 18.37 feet

D 28.98 feet

5. Susan is making a small cone out of paper. The cone has a radius of 13.2 cm, and the angle between the lateral surface and the base is 38.6°. The formula for the lateral area, *s*, of a cone is $s = \pi rl$, where *r* is the radius and *l* is the slant height. What is the cone's ***approximate*** lateral area?

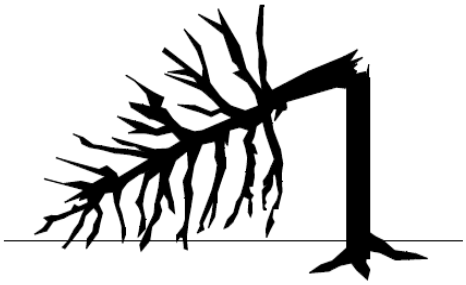
A 340 cm²

B 430 cm²

C 700 cm²

D 880 cm²

6. A dead tree was struck by lightning, causing it to fall over at a point 10 ft up from its base.



If the fallen treetop forms a 40° angle with the ground, ***about*** how tall was the tree originally?

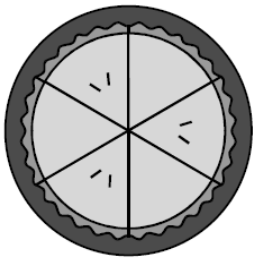
A 13 ft

B 16 ft

C 23 ft

D 26 ft

7. An apple pie is cut into six equal slices as shown below.



If the diameter of the pie is ten inches, what is the ***approximate*** arc length of one slice of pie?

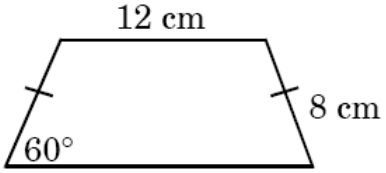
A 1.67 in.

B 3.14 in.

C 5.24 in.

D 13.08 in.

8. What is the ***approximate*** area of the trapezoid?



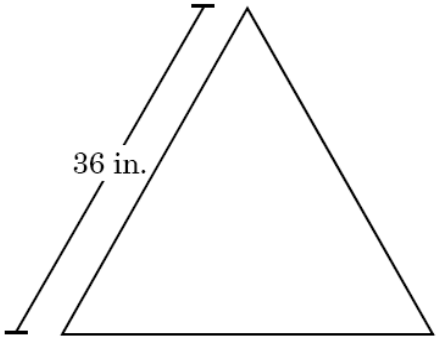
A 83 cm²

B 110 cm²

C 128 cm²

D 192 cm²

9. A sign is shaped like an equilateral triangle.



If one side of the sign is 36 inches, what is the ***approximate*** area of the sign?

A 108 in².

B 561 in.²

C 648 in.²

D 1,296 in.²

10. An inflated round balloon with radius $r = 50$ centimeters holds approximately 523,600 cubic centimeters of air. When the balloon is contracted such that the radius is 2/3 the original size, what is the ***approximate*** volume of the partially deflated balloon?

    A $1.94 \times 10^4 \ cm^3$

    B $1.55 \times 10^5 \ cm^3$

    C $1.75 \times 10^5 \ cm^3$

    D $3.49 \times 10^5 \ cm^3$

11. What is the ***approximate*** distance between the points (750, 900, 1,500) and (950, 800, 550) ?

    A 976 units

    B 1,025 units

    C 2,062 units

    D 952,500 units

12. What is the ratio of the surface areas of two spheres with volumes of 64 cm^3 and 125 cm^3?

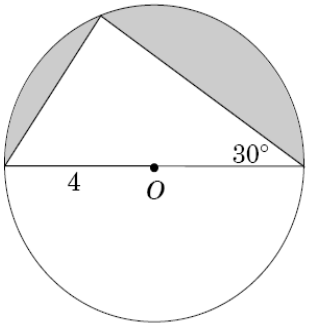
    A 4 : 5

    B 8 : 10

    C 16 : 25

    D 64 : 125

13. What is the ***approximate*** area of the shaded region?



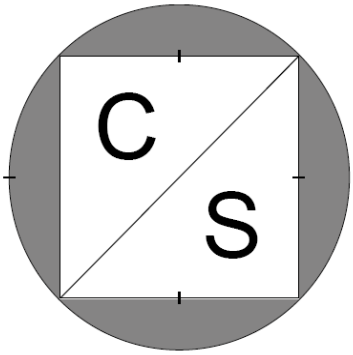
    A 8.57 square units

    B 8.70 square units

    C 9.13 square units

    D 11.28 square units

14. Marianna designed the logo shown for a computer software company.



    If the diameter of the circle is 8 cm, what is the ***approximate*** area of the shaded part of the logo?

    A 18.27 cm^2

    B 32 cm^2

    C 50.24 cm^2

    D 65 cm^2

15. A point is randomly selected on $\overline{XY}$. What is the probability that it will be closer to the midpoint of $\overline{XY}$ than to either X or Y?

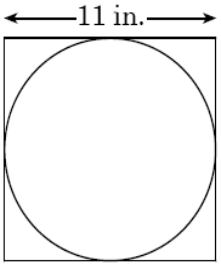
A $\frac{1}{4}$

B $\frac{1}{3}$

C $\frac{1}{2}$

D $\frac{3}{4}$

16. A circle is inscribed in a square, as shown below.



If a point is randomly chosen inside the square, what is the ***approximate*** chance that the point lies outside the circle?

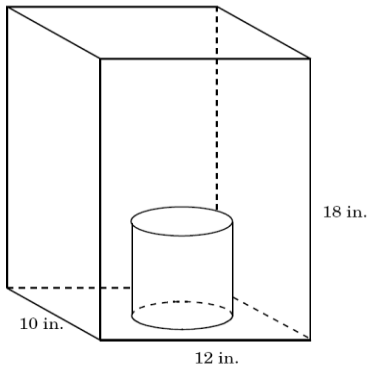
A 21%

B 27%

C 73%

D 79%

17. A cylinder with a height of 6 inches and a radius of 3 inches is inside a rectangular prism, as shown below.



A point inside the rectangular prism will be chosen randomly. What is the probability that the point will also be inside the cylinder?

A 5.2%

B 7.9%

C 15.7%

D 23.6%

18. A cube with edges 10 cm long is painted red. It is cut into smaller cubes with edges 2 cm long that are placed into a bag. One small cube is pulled out of the bag without looking. What is the probability of pulling out a cube with three of its faces painted red?

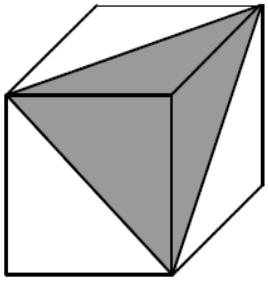
A $\frac{4}{125}$

B $\frac{8}{125}$

C $\frac{2}{25}$

D $\frac{12}{125}$

19. A cube is painted as shown. The three faces that are not seen are not painted.



If a point on the surface of the cube is randomly chosen, what is the probability that it will lie in the painted area?

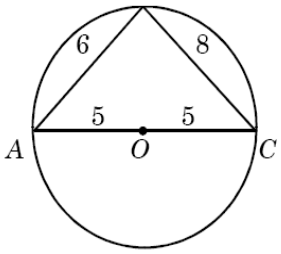
A $\frac{1}{4}$

B $\frac{1}{3}$

C $\frac{3}{8}$

D $\frac{1}{2}$

20. If Jim threw a marble inside the circle, what is the probability that it would land inside the triangle?



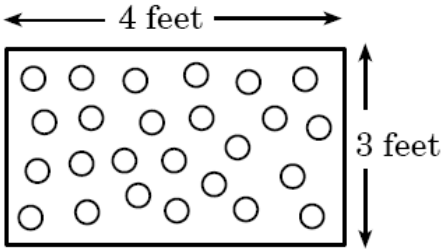
A 0.08

B 0.15

C 0.31

D 0.62

21. To win a carnival game, Keisha must throw a dart and hit one of 25 circles in a dart board that is 4 feet by 3 feet. The diameter of each circle is 4 inches



Approximately what is the probability that a randomly thrown dart that hits the board would also hit a circle?

A 18%

B 26%

C 63%

D 73%

End of Goal 1

22. The conditional statement "all 45° angles are acute angles" is true. Based on this conditional statement, which of the following can be concluded from the additional statement "the measure of $\angle A$ is 45"?

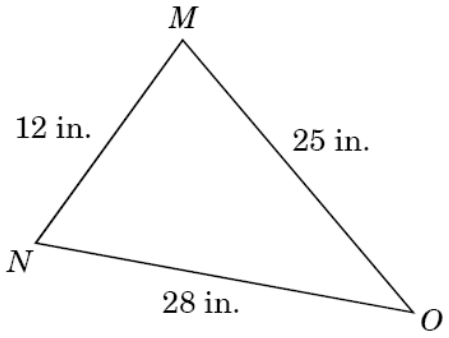
    A The complement of $\angle A$ is not an acute angle

    B The supplement of $\angle A$ is an acute angle.

    C $\angle A$ is an acute angle.

    D $\angle A$ is not an acute angle.

23. ΔMNO is shown below.



    Which statement about this triangle is true?

    A $m\angle O > m\angle M$

    B $m\angle M > m\angle N$

    C $m\angle M < m\angle N$

    D $m\angle N < m\angle O$

24. What is the contrapositive of the statement below?

If a triangle is isosceles, then it has two congruent sides.

    A If a triangle does not have two congruent sides, then it is not isosceles.

    B If a triangle is isosceles, then it does not have two congruent sides.

    C If a triangle has two congruent sides, then it is isosceles.

    D If a triangle is not isosceles, then it does not have two congruent sides.

25. Which statement is the inverse of the statement in the box?

If a quadrilateral is a rectangle, then it is a parallelogram.

    A If a quadrilateral is not a parallelogram, then it is not a rectangle.

    B If a quadrilateral is a parallelogram, then it is a rectangle.

    C If a quadrilateral is not a rectangle, then it is not a parallelogram.

    D A quadrilateral is a rectangle if and only if it is a parallelogram.

26. Given:
If there was lightning, then we did not swim.
If there was lightning, then we did not jog.

Using either one or both of the given statements, which conclusion is valid?

A If we did not swim, then we did not jog.

B If we did not jog, then there was lightning.

C If we did swim, then we did not jog.

D If we did jog, then there was not lightning.

27. Given the statements:

Linear pairs are supplementary. $\angle 1$ and $\angle 2$ are supplementary.

Using either one or both of the given statements, which conclusion is valid?

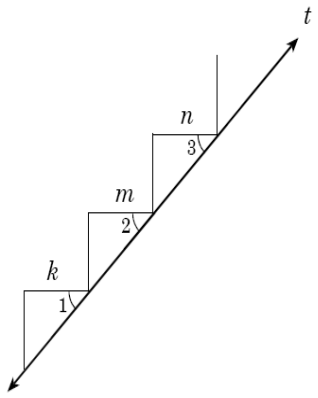
A $\angle 1$ and $\angle 2$ form a linear pair.

B Angles that are not supplementary are not linear pairs.

C $\angle 1 \cong \angle 2$

D Supplementary angles are linear pairs.

28. Given: $k \parallel m \parallel n$



Which statement justifies the conclusion that $\angle 1 \cong \angle 2 \cong \angle 3$?

A If $k \parallel m \parallel n$ and are cut by transversal t, then alternate interior angles are congruent.

B If $k \parallel m \parallel n$ and are cut by transversal t, then vertical angles are congruent.

C If $k \parallel m \parallel n$ and are cut by transversal t, then alternate exterior angles are congruent.

D If $k \parallel m \parallel n$ and are cut by transversal t, then corresponding angles are congruent.

29. What is the inverse of the statement below?

> If a triangle is scalene, then no two angles are congruent.

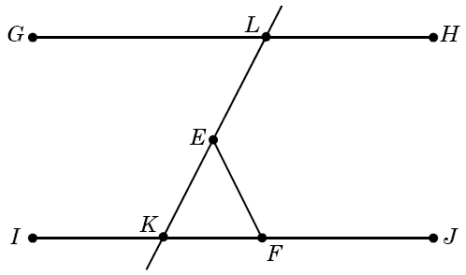
A If the triangle is not scalene, then there are two congruent angles.

B If two angles of a triangle are congruent, then the triangle is scalene.

C If there are two congruent angles in a triangle, then the triangle is not scalene.

D If the triangle is not scalene, then there are no congruent angles.

30. In the diagram, $\overline{GH} \parallel \overline{IJ}$.



If $m\angle GLK = 55°$ and $m\angle EFJ = 120°$, what is $m\angle KEF$?

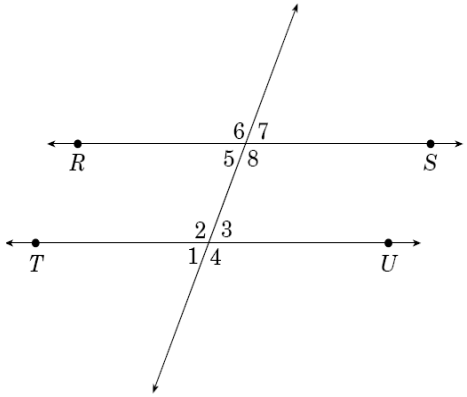
A 55º

B 60º

C 65º

D 70º

31. Given $\overleftrightarrow{RS} \parallel \overleftrightarrow{TU}$, $m\angle 7 = (3x - 10)°$ and $m\angle 3 = (2x + 5)°$.



What is $m\angle 1$?

A 15º

B 35º

C 75º

D 145º

32. Plane *P* contains points *A*, *B*, and *C*. A different plane, plane *Q*, contains points *B*, *C*, and *D*. Which of the following represents the intersection of *P* and *Q*?

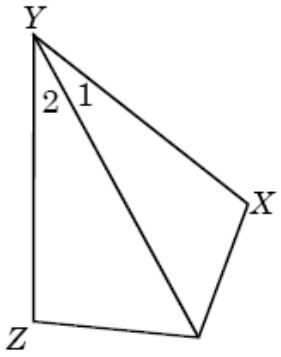
A $\overleftrightarrow{AD}$

B $\overleftrightarrow{BC}$

C $\overline{BC}$

D points *B*, *C*, *A*, and *D*

33. $\angle XYZ$ shown below has a measure of $(8x + 12)^o$. The measure of $\angle 1$ is $(4x + 8)^o$ and the measure of $\angle 2$ is $(9x – 11)^o$.



What is the measure of $\angle XYZ$?

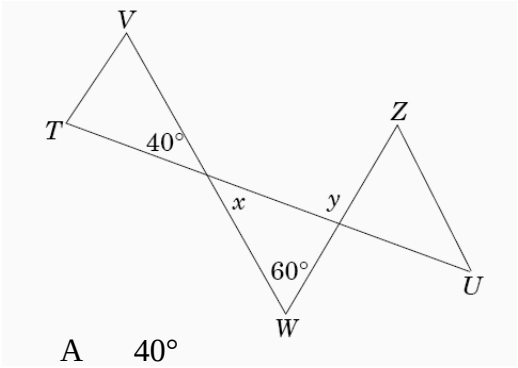
A 3°

B 20°

C 36°

D 60°

34. In the drawing, what is the measure of angle *y*?



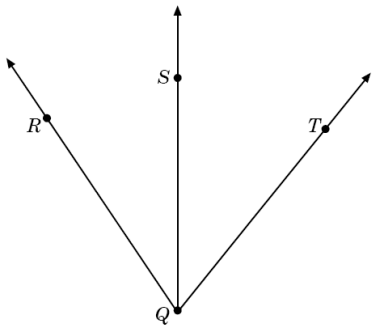
A 40°

B 60°

C 80°

D 100°

35. Given $m\angle RQS = (\frac{1}{2}x + 4)^o$, $m\angle SQT = (\frac{3}{4}x - 6)^o$ and $m\angle RQT = (2x - 47)^o$.



What is $m\angle RQS$?

A 24º

B 34º

C 39º

D 60º

36. The measure of each exterior angle of a regular polygon is 45°. How many sides does the polygon have?

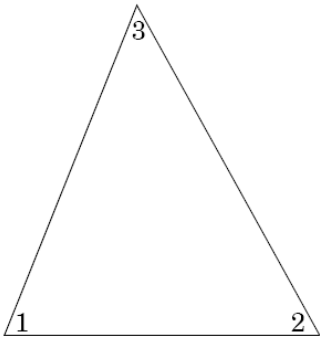
A 4

B 5

C 8

D 9

37. Given: $m\angle 1 = (4x)^\circ$, $m\angle 2 = (3x+10)^\circ$, and $m\angle 3 = (2x+17)^\circ$.



What is $m\angle 2$?

A 17°

B 31°

C 47°

D 61°

38. A regular octagon is inscribed in a circle. What is the degree measure of each arc joining the consecutive vertices?

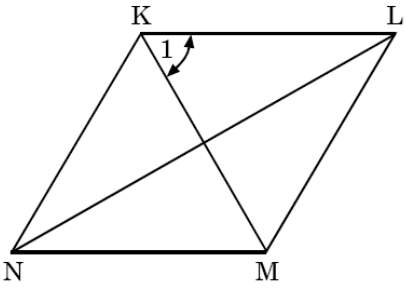
A 40°

B 45°

C 54°

D 60°

39. If *KLMN* is a rhombus, and $m\angle KLM$ = 80°, what is the measure of $\angle 1$?



A 40°

B 50°

C 80°

D 90°

40. *ABCD* is a parallelogram. If $m\angle BCD = (6x-20)^\circ$ and $m\angle DAB = (2x+80)^\circ$ what is the value of *x*?

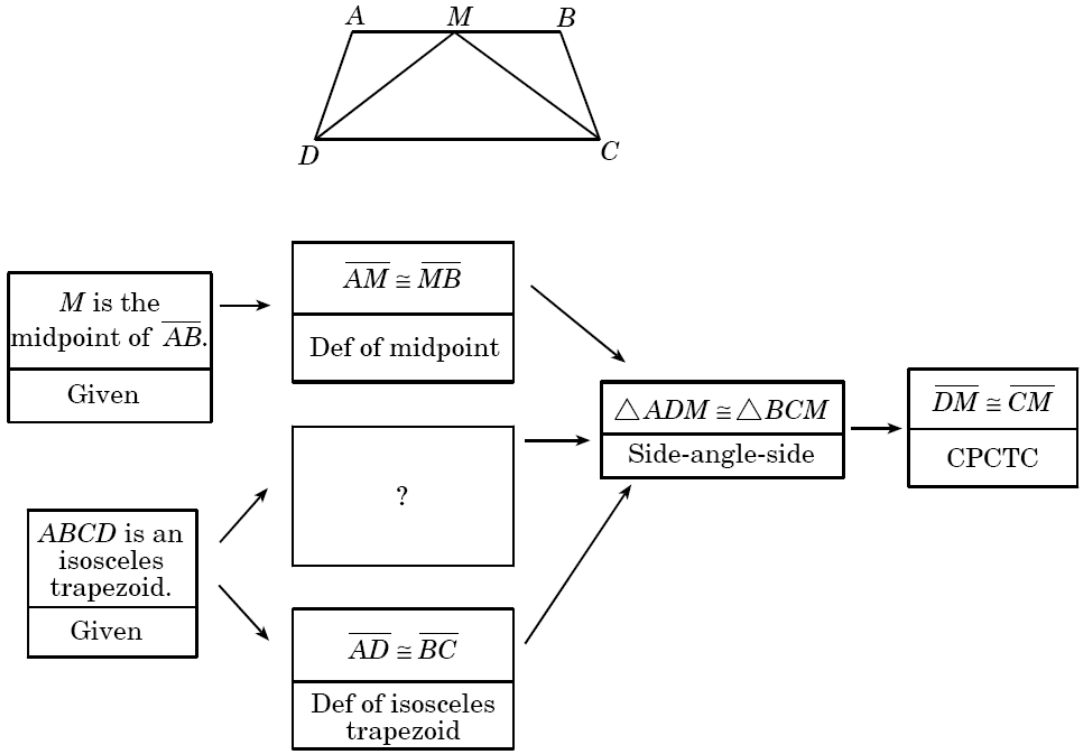
A 8.3

B 12.5

C 15

D 25

41. Given: ABCD is an isosceles trapezoid. M is the midpoint of $\overline{AB}$.
Prove: $\overline{DM} \cong \overline{CM}$

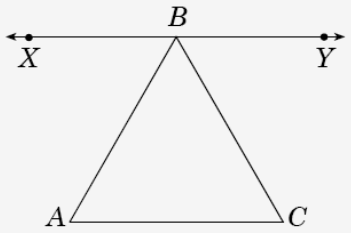


What is the missing statement and reason that completes the proof shown above?

A $\overline{AD} \cong \overline{BC}$; the legs of an isosceles trapezoid are congruent.
B $\angle MAD \cong \angle MBC$; the base angles of an isosceles trapezoid are congruent.
C $\overline{AM} \cong \overline{BM}$; the corresponding parts of congruent triangles are congruent.

D $\angle ABC \cong \angle DAB$; if lines are parallel, interior angles on the same side of a transversal are supplementary.

42. Given: ΔABC
Prove: $m\angle BAC + m\angle ABC + m\angle BCA = 180$.



Statements	Reasons
1) Draw $\overline{XY}$ through B and parallel to $\overline{AC}$.	1) There is exactly one line through a point not on a given line that is parallel to the given line.
2) $\angle XBA$ and $\angle ABY$ form a linear pair.	2) definition of a linear pair
3) $m\angle XBA + m\angle ABY = 180$	3) The sum of the measures of the angles in a linear pair is 180°.
4) $m\angle ABC + m\angle CBY = m\angle ABY$	4) angle addition postulate
5) $m\angle XBA + m\angle ABC + m\angle CBY = 180$	5) substitution
6) $\angle CBY \cong \angle BCA$ and $\angle XBA \cong \angle BAC$	6) _____
7) $m\angle CBY = m\angle BCA$ and $m\angle XBA = m\angle BAC$	7) definition of congruent angles
8) $m\angle BAC + m\angle ABC + m\angle BCA = 180$	8) substitution

What is the reason for statement 6 in the proof shown above?

A Alternate interior angles formed by parallel lines and a transversal are congruent.

B Alternate exterior angles formed by parallel lines and a transversal are congruent.

C Vertical angles formed by parallel lines and a transversal are congruent.

D Corresponding angles formed by parallel lines and a transversal are congruent.

43. In a hexagon, three angles have the same measure. The measure of each of the congruent angles is twice the measure of the fourth angle and is half the measure of the fifth angle. The sixth angle measures 115°. What is the measure of the smallest angle?

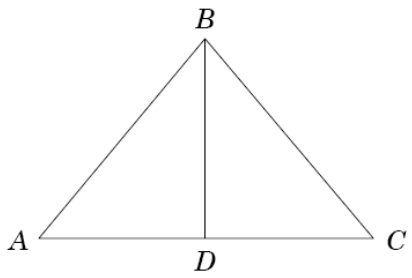
A 41°

B 55°

C 110°

D 121°

44. $\overline{BD}$ is the angle bisector of $\angle ABC$.



If $m\angle A = m\angle C = 50°$, what is $m\angle ABD$?

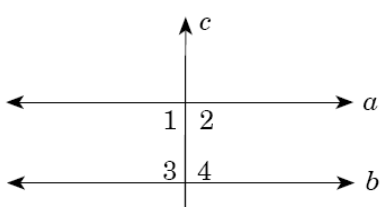
A 30º

B 40º

C 45º

D 50º

45. In the figure below, $\angle 1$ is supplementary to $\angle 3$ under which of the following conditions?



A Line *a* is parallel to line *b.*

B Line *a* is parallel to line c.

C Line *a* is perpendicular to line *c*.

D Line *b* is perpendicular to line *c*.

46. $\overrightarrow{OB}$ bisects $\angle AOC$. If $m\angle AOB = (3x + 16)^o$ and $m\angle BOC$ $(8x – 14)^o$, what is $m\angle AOB$?

A 18º

B 26º

C 34º

D 48º

47. For which type of convex polygon is the sum of the interior angles equal to the sum of the exterior angles, one at each vertex?

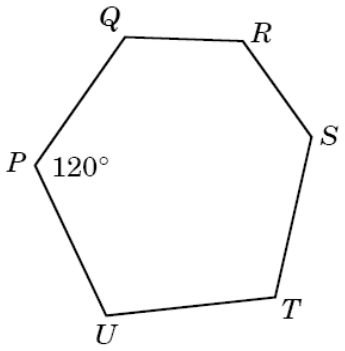
A triangle

B hexagon

C pentagon

D quadrilateral

48. If $m\angle P = 120°$, what is the sum of the measures of the remaining interior angles?



A 240º

B 360º

C 600º

D 720º

49. Triangle *MNO* has coordinates *M*(0, 2), *N*(1, 0), and *O*(5, 1). What type of triangle is ΔMNO?

A equilateral

B isosceles

C right

D scalene

50. In ΔXYZ, *W* is between *Y* and *Z*. The coordinates are *X*(2, 3), *Y*(5, 0), *Z*(0, 0), and *W*(2, 0). What is $\overline{XW}$?

A altitude

B angle bisector

C median

D perpendicular bisector of the side

51. In rectangle *ABCD*, diagonal $AC = (3x - 9)$ and diagonal $BD = (x + 13)$. What is *AC*?

A 16

B 18

C 24

D 32

52. In parallelogram *RSTU*, the diagonals intersect at *E*. If $RE = 10$ and $SU = 16$, what is *RT*?

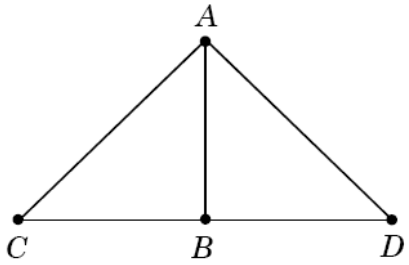
A 8

B 10

C 16

D 20

53. It is given that $\overline{AC} \cong \overline{AD}$ and $\angle CAB \cong \angle DAB$. By the reflexive property, $\overline{AB} \cong \overline{AB}$.



Which reason could be used to prove $\Delta ABC \cong \Delta ABD$?

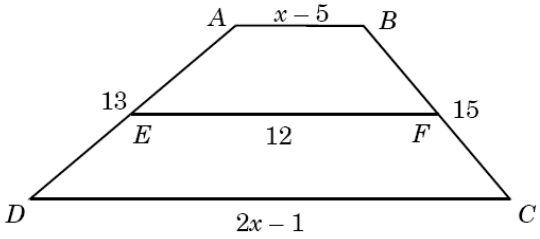
A side-angle-side

B hypotenuse-leg

C side-side-side

D angle-side-angle

54. *ABCD* is a trapezoid with median $\overline{EF}$. What is the length of $\overline{AB}$?



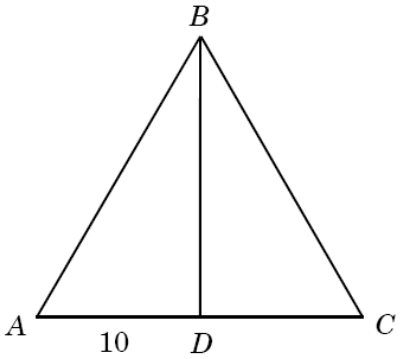
A 5 units

B 7 units

C 9 units

D 10 units

55. ΔABC is an isosceles triangle with *AB* = *BC* and median $\overline{BD}$. The perimeter of ΔABC is 60 units.



What is *AB*?

A 10 units

B 15 units

C 20 units

D 40 units

56. If the sides of a triangle are 3, 7, and *x*, which of the following ***best*** describes *x*?

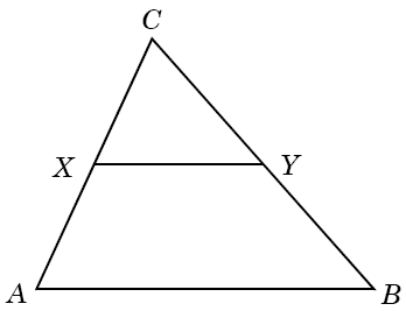
A $4 < x < 10$

B $4 \le x \le 10$

C $x < 10$

D $x > 4$

57. In ΔABC, X is the midpoint of $\overline{AC}$ and Y is the midpoint of $\overline{BC}$.



If $m\angle C = 67°$ and $m\angle A = 72°$, What is $m\angle CYX$?

A 36º

B 41º

C 67º

D 72º

58. On a map, the points (2, 1), (5, -2), and (-3, -4) are located on the circular boundary of a town. Which point locates the center of the town?

A (1, -3)

B $(\frac{1}{2}, -3)$

C (8, -12)

D (-1, 3)

59. A triangle has interior angles that measure $(3x)^o$, $(2x + 15)^o$, and $(x + 45)^o$. What is the measure of the largest exterior angle?

A 115º

B 120º

C 125º

D 160º

60. What is the ***most specific*** name for quadrilateral *ABCD* with vertices *A*(0, 0), *B*(3, 4), *C*(6, 0), and *D*(3, - 4)?

A parallelogram

B rectangle

C rhombus

D trapezoid

61. A broadcast tower is located at point (-1, 3) on an *xy*-coordinate grid, where each unit is one mile. If its broadcast reaches only a 20-mile radius, what is the set of points where the broadcast is received by its listeners?

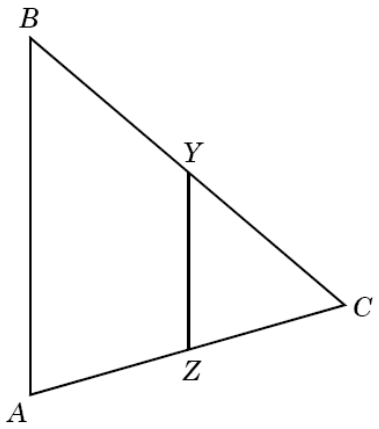
A $(x+1)^2 + (y-3)^2 \leq 400$

B $(x+1)^2 + (y-3)^2 \geq 400$

C $(x-1)^2 + (y-3)^2 \geq 400$

D $(x-1)^2 + (y+3)^2 \leq 400$

62. In ΔABC, Z is the midpoint of $\overline{AC}$ and Y is the midpoint of $\overline{BC}$.



If $YZ = 21$ and $AB = (2x - 4)$, what is x?

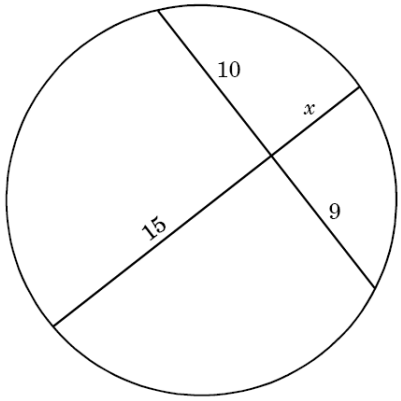
A 7.25

B 12.5

C 23

D 46

63. In the circle below, what is the value of x?



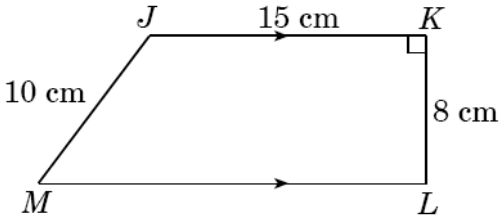
A 4 units

B 6 units

C 7 units

D 9 units

64. In $JKLM$, $\overline{JK} \perp \overline{KL}$ and $\overline{JK} \parallel \overline{ML}$.



What is the area of the trapezoid?

A 120 sq cm

B 144 sq cm

C 164 sq cm

D 168 sq cm

65. Which of the following statements is true?

A A chord is contained in a tangent.

B A chord is contained in a radius.

C A chord is contained in a secant.

D A chord is contained in an arc.

66. A triangle has side lengths of 10 cm, 15 cm, and 20 cm. Which side lengths form the largest angle?

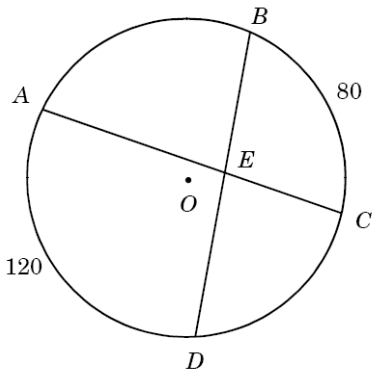
A 5 cm, 10 cm

B 10 cm, 15 cm

C 10 cm, 20 cm

D 15 cm, 20 cm

67. In circle *O*, the measure of arc *AD* = 120º and the measure of arc *BC* = 80º.



What is $m\angle BEC$?

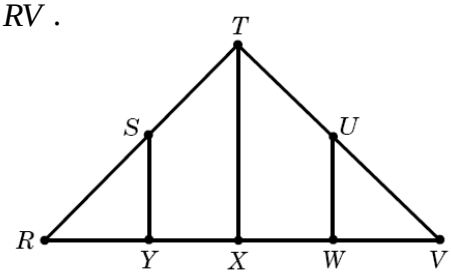
A 30º

B 80º

C 100º

D 160º

68. In the triangle, $\overline{UW}$ bisects $\overline{XV}$. $\overline{TX}$ and $\overline{UW}$ are perpendicular to $\overline{RV}$.



If *TX* = 12 ft and *XV* = 10 ft, ***about*** how long is $\overline{UV}$?

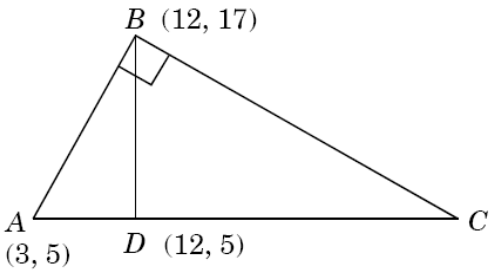
A 5 ft

B 6 ft

C 8 ft

D 10 ft

69. ΔABC is a right triangle with altitude $\overline{BD}$.



What are the coordinates of point *C*?

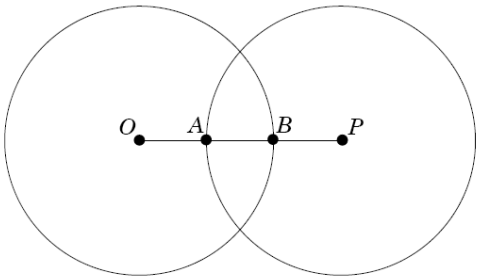
A (9, 5)

B (16, 5)

C (27, 5)

D (28, 5)

70. In order to create a pattern for a blanket, Ming needs to use two congruent circles as shown.



If *OP* = 31 in. and *AB* = 5 in., what is the radius of one of the circles?

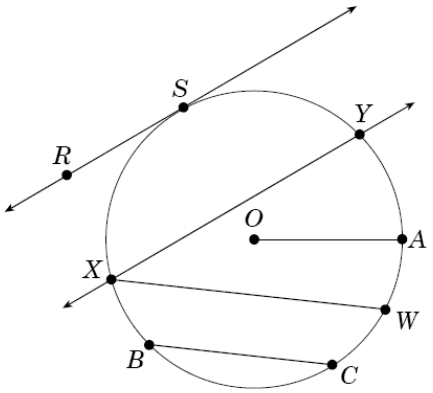
A 13 in.

B 15.5 in.

C 16.5 in.

D 18 in.

71. In circle *O*, which term correctly identifies $\overleftrightarrow{XY}$?



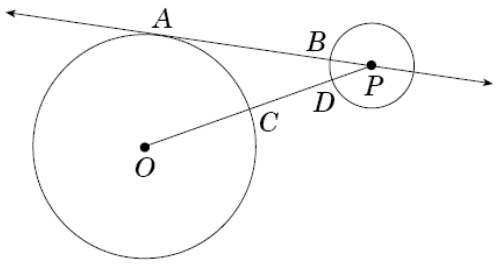
A chord

B radius

C secant

D tangent

72. $\overleftrightarrow{AP}$ is tangent to circle *O* at *A*, circle *O* has a radius of 6 ft., circle *P* has a radius of 2 ft., and *AB* = 6 ft.



What is *CD*?

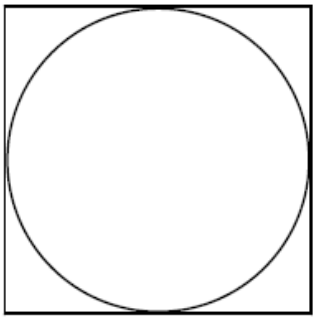
A 1 ft

B 2 ft

C 3 ft

D 4 ft

73. A gardener wants to enclose a circular garden with a square fence, as shown below.



If the circumference of the circular garden is about 48 feet, which of the following is the ***approximate*** length of fencing needed?

A 31 ft

B 61 ft

C 122 ft

D 244 ft

74. The vertices of a hexagon are (6, 7), (9, 1), (6, -4), (-1, -4), (-6, 1), and (-1, 7). Which ***best*** describes the hexagon?

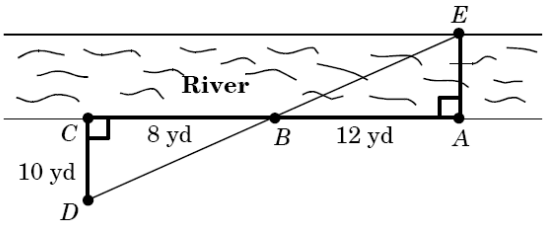
A nonregular and convex

B nonregular and concave

C regular and convex

D regular and concave

75. Jill wants to measure the width of a river. She marks distances as shown in the diagram.



Using this information, what is the ***approximate*** width of the river?

A 6.6 yards

B 10 yards

C 12.8 yards

D 15 yards

76. The exterior angle of a base angle in an isosceles triangle is 100°. What is the measure of the vertex angle?

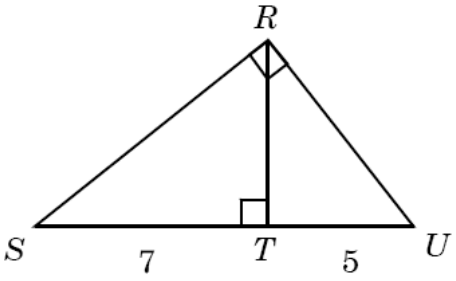
A 20°

B 40°

C 60°

D 80°

77. Right ΔSRU is shown below.



What is the length of $\overline{RS}$?

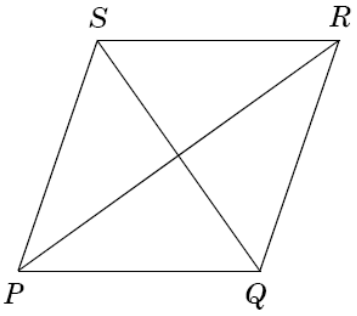
A $\sqrt{84}$

B $\sqrt{74}$

C $\sqrt{60}$

D $\sqrt{35}$

78. If *PQRS* is a rhombus, which statement must be true?



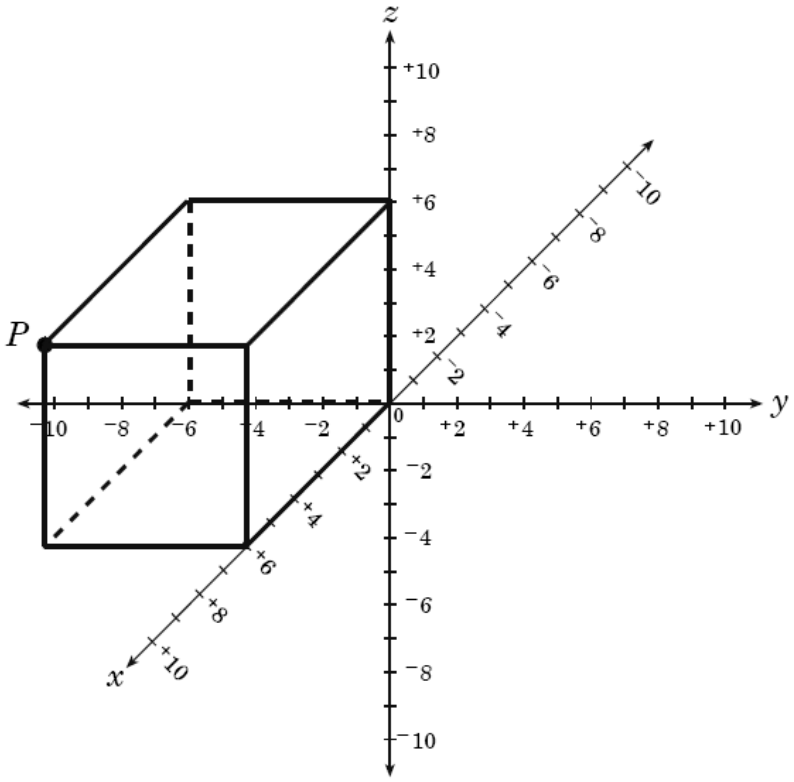
A $\angle PSR$ is a right angle

B $\overline{PR} \cong \overline{QS}$

C $\angle PQR \cong \angle QRS$

D $\overline{PQ} \cong \overline{QR}$

79. In the picture below, what are the coordinates of *P*?



A (0, 6, 6)

B (-6, 0, 6)

C (-6, 6, 0)

D (6, -6, 6)

---

80. A regular octahedron has eight faces that are congruent equilateral triangles. How many edges does a regular octahedron have?

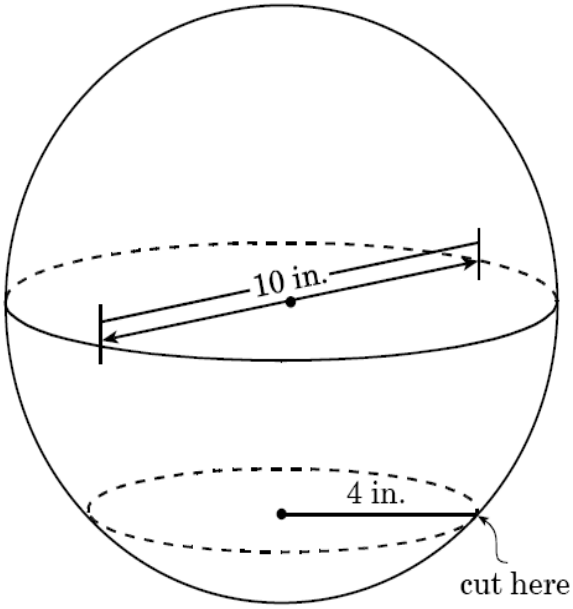
A 12

B 16

C 17

D 24

81. A spherical foam ball, 10 inches in diameter, is used to make a tabletop decoration for a party. To make the decoration sit flat on the table, a horizontal slice is removed from the bottom of the ball, as shown below.



If the radius of the flat surface formed by the cut is 4 inches, what is the height of the decoration?

A 4 in.

B 6 in.

C 8 in.

D 10 in.

82. What is the ***approximate*** surface area of a regular tetrahedron with edge length 12 cm?

A 166.3 sq cm

B 187.1 sq cm

C 249.4 sq cm

D 498.8 sq cm

83. Which of the following polyhedrons has exactly two congruent bases?

A dodecahedron

B prism

C pyramid

D tetrahedron

84. Two tetrahedra are congruent. One tetrahedron is glued to the other so that the glued faces of the two tetrahedra completely cover each other, producing a new polyhedron. How many faces does the new polyhedron have?

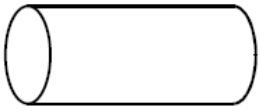
A 6

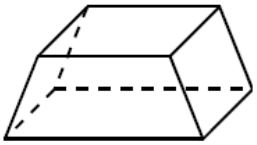
B 7

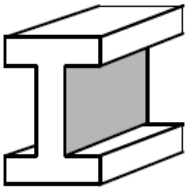
C 8

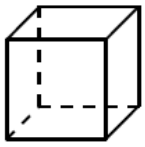
D 9

85. Which of the following is a regular polyhedron?

A 

B 

C 

D 

86. The intersection of a sphere and a plane is a circle with a radius of 8 cm. If the sphere has a radius of 18 cm, how far is the plane from the center of the sphere?

A 8.00 cm

B 10.00 cm

C 14.97 cm

D 16.12 cm

End Goal 2

87. Point $J(p, q)$ is a vertex of quadrilateral *JKLM*. What are the coordinates of J' after *JKLM* is rotated 180° about the origin?

A $(-p, -q)$

B $(-p, q)$

C $(p, -q)$

D $(q, -p)$

88. ΔGHI will be dilated by a scale factor of 3, resulting in $\Delta G'H'I'$. What rule describes this transformation?

A $(x', y') = \left(\frac{1}{3}x, \frac{1}{3}y\right)$

B $(x', y') = (3x, 3y)$

C $(x', y') = (x + 3, y + 3)$

D $(x', y') = (x - 3, y - 3)$

89. $\Delta P'Q'R'$ is the image produced after reflecting ΔPQR across the *y*-axis. If vertex *P* has coordinates (s, t), what are the coordinates of P'?

A (t, s)

B $(s, -t)$

C $(-s, -t)$

D $(-s, t)$

90. What is the rule for the transformation formed by a translation 2 units to the left and 3 units up followed by a 90° counterclockwise rotation?

A $(x'', y'') = (-3y, -2x)$

B $(x'', y'') = (x - 2, y + 3)$

C $(x'', y'') = [-(y + 3), x - 2]$

D $(x'', y'') = [-(y - 3), x + 3]$

91. The point $G(2, -7)$ is transformed according to the rule $(x', y') = (x + 2, y - 3)$. The image G' of the transformation is then reflected over the line $y = x$, resulting in point G''. What are the coordinates of G''?

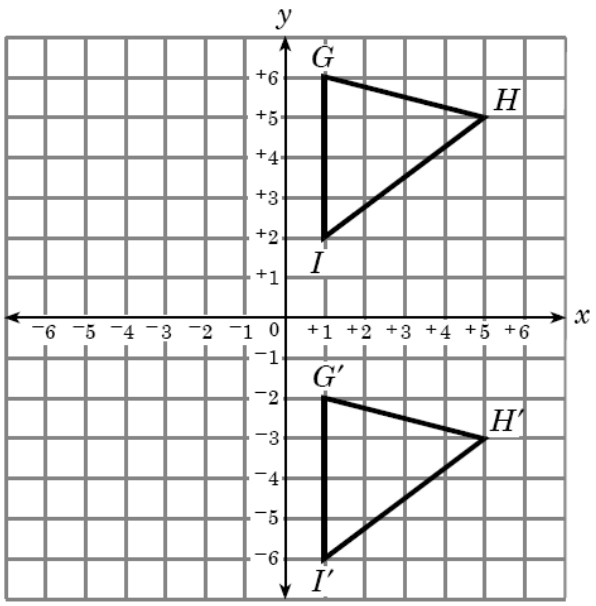
A (4, 10)

B (4, -10)

C (-10, 4)

D (-4, 10)

92. $\Delta G'H'I'$ is the image of ΔGHI after a transformation.



Which choice describes the transformation shown?

A reflection over x-axis

B reflection over y-axis

C $(x', y') = (x - 8, y)$

D $(x', y') = (x, y - 8)$

93. ΔXYZ is dilated by a factor of ½.
What is the ratio of the area of ΔXYZ to the area of its image, $\Delta X'Y'Z'$?

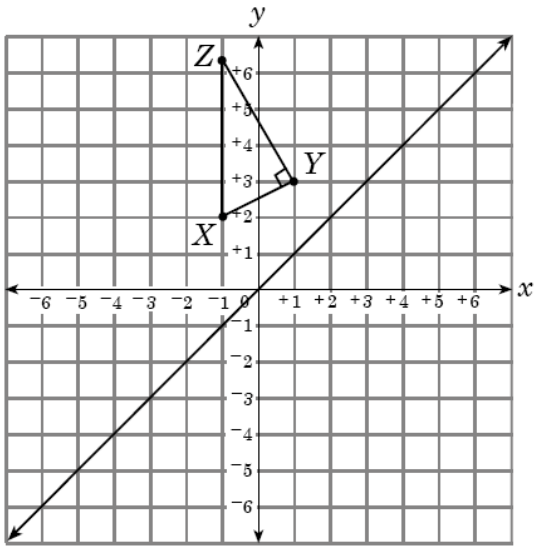
A 4 : 1

B 2 : 1

C 1 : 2

D 1 : 4

94. In the coordinate plane, right triangle XYZ is reflected over the line $y = x$.



What are the coordinates of the vertex of the right angle in $\Delta X'Y'Z'$?

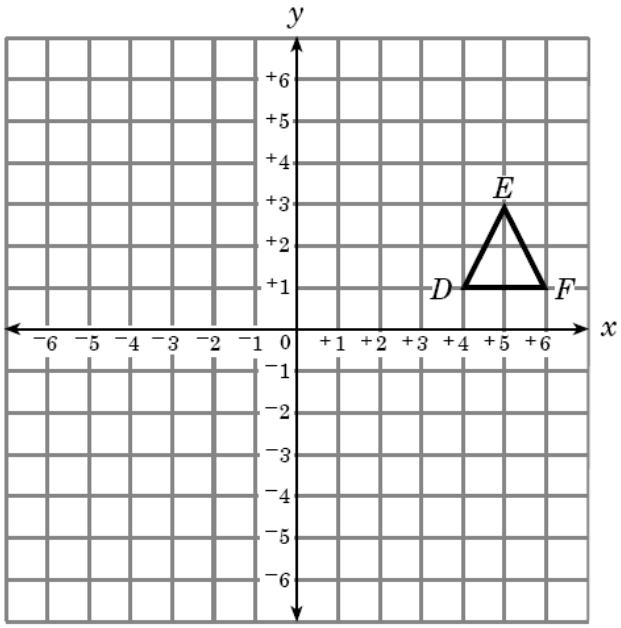
A (3, 1)

B (3, 0)

C (1, -3)

D (1, -2)

95. ΔDEF is reflected across the line $y = x$.



Which matrix multiplication shows how to find $\Delta D'E'F'$?

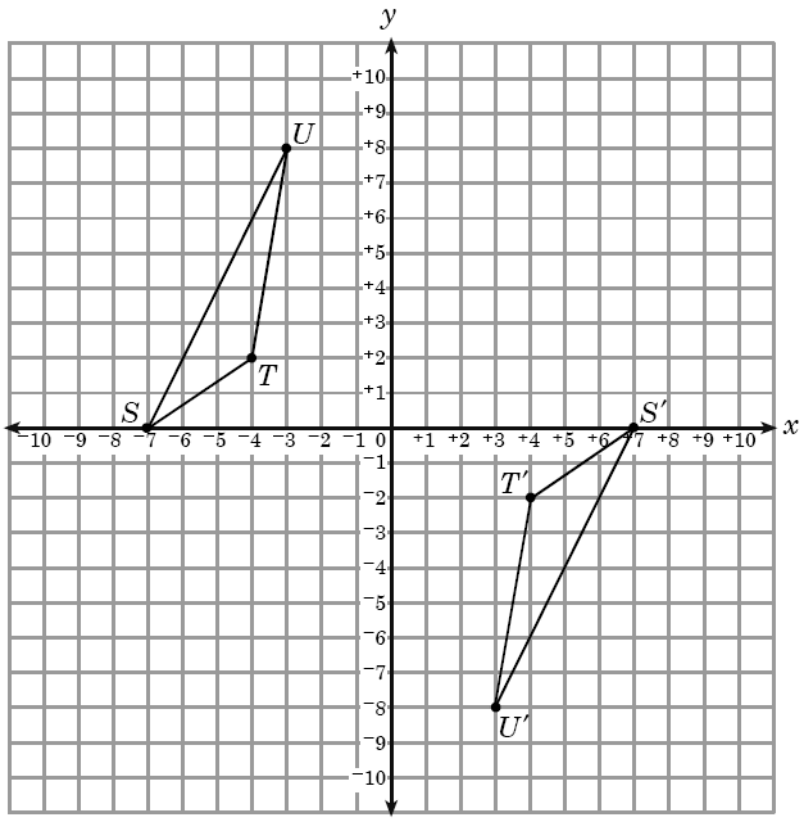
A $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}\begin{bmatrix} 4 & 5 & 6 \\ 1 & 3 & 1 \end{bmatrix}$

B $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}\begin{bmatrix} 4 & 5 & 6 \\ 1 & 3 & 1 \end{bmatrix}$

C $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}\begin{bmatrix} 4 & 5 & 6 \\ 1 & 3 & 1 \end{bmatrix}$

D $\begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}\begin{bmatrix} 4 & 5 & 6 \\ 1 & 3 & 1 \end{bmatrix}$

96. Which matrix calculation was used to transform ΔSTU to $\Delta S'T'U'$?



A $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}\begin{bmatrix} -7 & -4 & -3 \\ 0 & 2 & 8 \end{bmatrix}$

B $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}\begin{bmatrix} -7 & -4 & -3 \\ 0 & 2 & 8 \end{bmatrix}$

C $\begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}\begin{bmatrix} -7 & -4 & -3 \\ 0 & 2 & 8 \end{bmatrix}$

D $\begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}\begin{bmatrix} -7 & -4 & -3 \\ 0 & 2 & 8 \end{bmatrix}$

97. Triangle *MRT* has vertices at *M*(3, 8), *R*(7, -2), and *T*(-5, -4). If the triangle is to be translated by the rule $(x', y') = (x + 3, y - 2)$, which matrix expression models the translation?

A $\begin{bmatrix} 3 & 7 & -5 \\ 8 & -2 & -4 \end{bmatrix} + \begin{bmatrix} 3 & 3 & 3 \\ -2 & -2 & -2 \end{bmatrix}$

B $\begin{bmatrix} 3 & 7 & -5 \\ 8 & -2 & -4 \end{bmatrix} - \begin{bmatrix} -2 & -2 & -2 \\ 3 & 3 & 3 \end{bmatrix}$

C $\begin{bmatrix} 3 & 7 & -5 \\ 8 & -2 & -4 \end{bmatrix} + \begin{bmatrix} -2 & -2 & -2 \\ 3 & 3 & 3 \end{bmatrix}$

D $\begin{bmatrix} 3 & 7 & -5 \\ 8 & -2 & -4 \end{bmatrix} - \begin{bmatrix} 3 & 3 & 3 \\ -2 & -2 & -2 \end{bmatrix}$

---

98. ΔGHJ with vertex matrix $\begin{bmatrix} -2 & 3 & 3 \\ 4 & 6 & -2 \end{bmatrix}$ is dilated by a factor of $\frac{1}{3}$. In the image $\Delta G'H'J'$, what are the coordinates of the vertex that lies in the second quadrant?

A $\left(-\frac{7}{3}, \frac{13}{3}\right)$

B $\left(-\frac{2}{3}, \frac{4}{3}\right)$

C $\left(1, -\frac{2}{3}\right)$

D (1, 2)

99. The vertices of quadrilateral *GHIJ* are *G*(-1, -1), *H*(3, -2), *I*(2, 4), and *J*(-2, 3). *G'H'I'J'* is the image produced by translating quadrilateral *GHIJ* 6 units to the left. Which matrix represents *G'H'I'J'*?

A $\begin{bmatrix} -7 & -3 & -4 & -8 \\ -7 & -8 & -2 & -3 \end{bmatrix}$

B $\begin{bmatrix} -7 & -3 & -4 & -8 \\ -1 & -2 & 4 & 3 \end{bmatrix}$

C $\begin{bmatrix} -1 & 3 & 2 & -2 \\ -7 & -8 & -2 & -3 \end{bmatrix}$

D $\begin{bmatrix} 5 & 9 & 8 & 4 \\ -1 & -2 & 4 & 3 \end{bmatrix}$

---

100. $\Delta M'N'O'$ is the image of ΔMNO produced by a translation 3 units left and 1 unit up. The vertex matrix for $\Delta M'N'O'$ is $\begin{bmatrix} -1 & 2 & 4 \\ 1 & 6 & -3 \end{bmatrix}$. Which is the vertex matrix for ΔMNO?

A $\begin{bmatrix} 2 & 5 & 7 \\ 0 & 5 & -4 \end{bmatrix}$

B $\begin{bmatrix} -4 & -1 & 1 \\ 2 & 7 & -2 \end{bmatrix}$

C $\begin{bmatrix} -2 & 1 & 3 \\ 4 & 9 & 0 \end{bmatrix}$

D $\begin{bmatrix} 0 & 3 & 5 \\ -2 & 3 & -6 \end{bmatrix}$

101. Polygon *FGHI* is represented by vertex matrix *M*.

$$M = \begin{bmatrix} 2 & 4 & 4 & 2 \\ -2 & -2 & -5 & -5 \end{bmatrix}$$

Which multiplication would be used to reflect polygon *FGHI* across the *x*-axis?

A $\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}\begin{bmatrix} 2 & 4 & 4 & 2 \\ -2 & -2 & -5 & -5 \end{bmatrix}$

B $\begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}\begin{bmatrix} 2 & 4 & 4 & 2 \\ -2 & -2 & -5 & -5 \end{bmatrix}$

C $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}\begin{bmatrix} 2 & 4 & 4 & 2 \\ -2 & -2 & -5 & -5 \end{bmatrix}$

D $\begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}\begin{bmatrix} 2 & 4 & 4 & 2 \\ -2 & -2 & -5 & -5 \end{bmatrix}$

End Goal 3