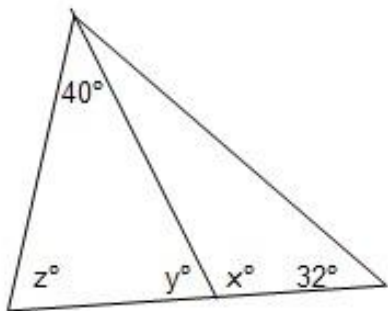


1. Assign the value of 1 to any statement below that is true. Assign the value or -1 to any statement below that is false.

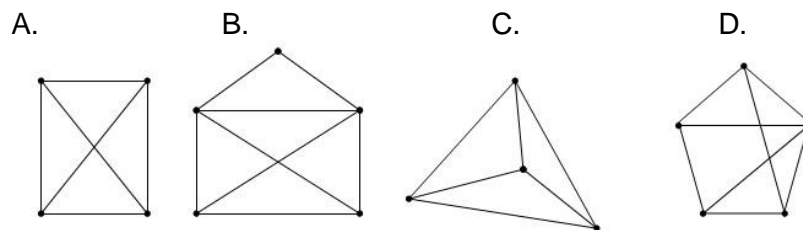
**What is the sum of the values assigned to the statements?**

- A. Under the translation  $(x,y) \rightarrow (x-2, y+2)$ , the point  $(3, -1)$  will become  $(1, 1)$ .
- B. If 2 sides and the included angle of one triangle are congruent to 2 sides and the included angle of another triangle, then the triangles are congruent.
- C. In a plane, there exist 3 non-collinear points.
- D. Two equilateral triangles are similar.
- E. A parallelogram has diagonals that bisect each other.

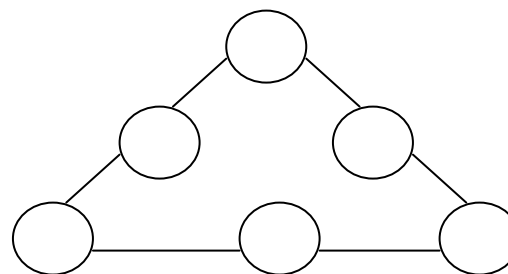
2. Given that  $x = \frac{3}{2}y$ , find the measure of angle z.



3. An Euler path is a continuous path that can be traveled along each edge exactly once. Which of the following below is an Euler path?



4. Write the numbers 1-6, one in each circle, so that the sum along any side is 9. You can use each number only once.



5. Mr. Hayden has bought a putter for his son's birthday. Since Tom lives some distance away, Mr. Hayden plans to mail it to him, but finds that the Post Office will not accept parcels longer than 70 cm or taller than 50 cm. However, the putter is 95 cm in length. However, Mr. Hayden is very clever and finds a way to package the putter so that it conforms to Post Office regulations. Either describe or illustrate how.

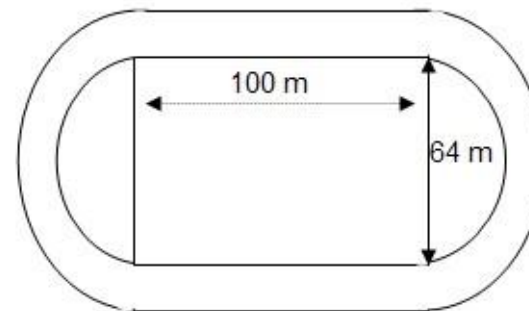
7. Which has the greatest volume:

- ◇ A cube with a side length of 6 inches
- ◇ A right circular cylinder with a radius of 3 inches and a height of 8 inches
- ◇ A sphere with a radius of 3.6 inches
- ◇ A cone with a radius of 4 inches and a height of 13 inches

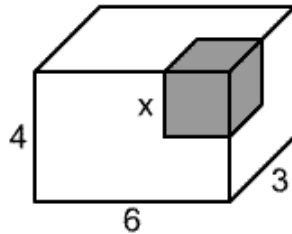
6. In the following magic square, the sum of the numbers in each row, column, and diagonal is equal to 15. If the digits 1-9 are each to be used in the square exactly once, what value goes where the star is located?

		9
*		

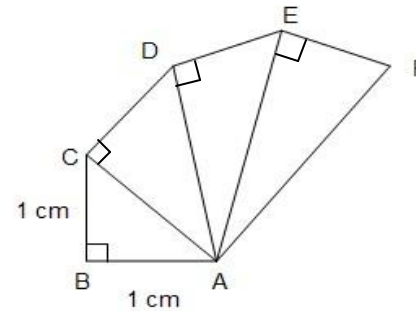
8. The track pictured below is around a field that is 100 meters long and 64 meters wide as pictured. The width of the track is 3 meters. If Stephanie runs 2 laps on the inside lane of the track while James runs 2 laps on the outside lane of the track, how much further does James run than Stephanie?



9. In the figure below, the shaded region is a cube with a side of  $x$  length. What is the volume of the unshaded region?



11. Given right triangles  $ABC$ ,  $ACD$ ,  $ADE$ , and  $AEF$  as pictured. Given that  $\overline{AB} = \overline{BC} = \overline{CD} = \overline{DE} = \overline{EF} = 1$  cm, find the length of  $\overline{AF}$



10. The area of square  $ABCD$  is 16 square units.  $EFGH$  is formed by joining the midpoints of the sides of  $ABCD$ .

$W$  = the length of a diagonal of  $ABCD$

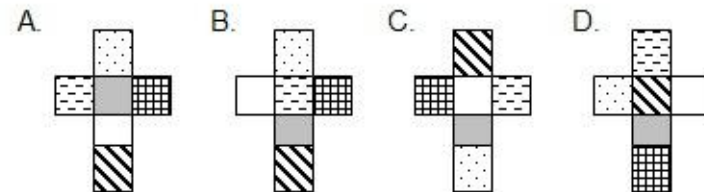
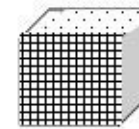
$X$  = the length of  $EF$

$Y$  = the perimeter of  $ABCD$

$Z$  = the length of a diagonal of  $EFGH$

Find the value of  $\frac{W}{X} + \frac{Y}{Z}$

12. Which of the four nets pictured below matches the cube?



13. Which is larger:

- ◇ The diagonal of a cube with side length of 5 inches
- ◇ The apothem for a regular hexagon that has a side length 10 inches

14. If LAST is a parallelogram with L located at the origin, A located at  $(0, y)$ , and T located at  $(b, c)$ , where is the location of point S?