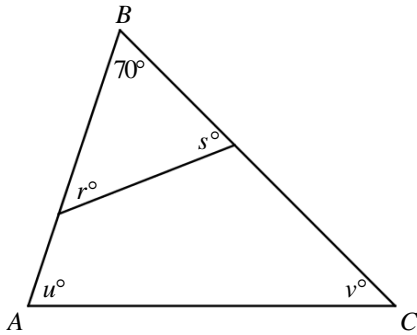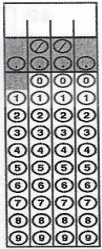1. If $a > 1$ and $a^b a^4 = a^{12}$, what is the value of $b$?

2. If $s = \dfrac{1}{x}$ and $q = \dfrac{1}{y}$ and if $x = 2$ and $y = 3$, what

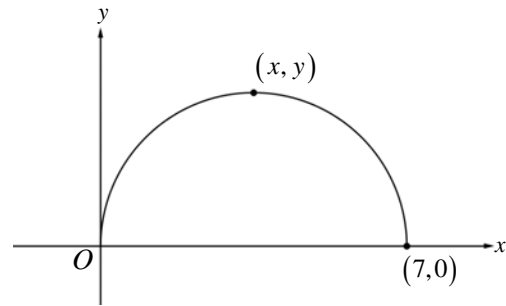   is the value of $\dfrac{1}{s} + \dfrac{1}{q}$?



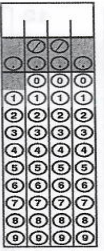3. In $\triangle ABC$ above, what is the value of $r + s + u + v$?

4. If $x^2 > x^4$ and $x > 0$, what is one possible value for $x$?

5. Four lines intersect in one point, forming 8 equal angles that are nonoverlapping. What is the measure, in degrees, of one of these angles?



6. In the figure above, what is the $y$-coordinate of the point on the semicircle that is the farthest from the $x$-axis?
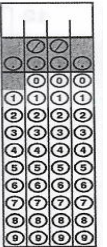
7. A teacher is to be assigned to teach 5 different courses in 5 different class periods on Mondays. If exactly one course meets each period, how many different assignments of courses to these class periods are possible for Mondays?

8. If the average (arithmetic mean) of three different positive integers is 70, what is the greatest possible value of one of the integers?
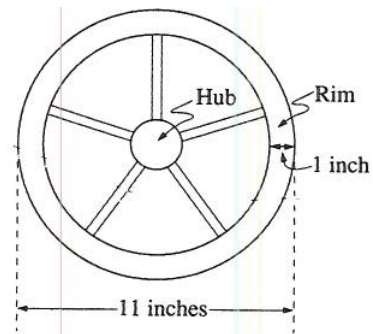


9. A wheel has an outer diameter of 11 inches, as shown above. The rim is 1 inch wide and the diameter of the hub is 2 inches. If each spoke extends $\dfrac{1}{2}$ inch into the hub and $\dfrac{1}{2}$ inch into the rim, what is the sum of the lengths of the five spokes, in inches?

1. 8

2. 5

3. 220

4. $0 < x < 1$

5. 45

6. 3.5

7. 120

8. 207

9. 30