

22. T.9 · Similarity, scaling and conic distance loci

Starter Quiz ·

GRE Subject Test · GRE Mathematics

Name: _____ Score: _____

1. Every length of a figure is increased by 20%. By what percentage does its area increase?

2. Two similar solids have volumes in ratio 8 : 125. What is the ratio of their surface areas, smaller to larger, as a decimal?

3. In the worked example, if instead $AP = 9$, what is PQ ?

4. For $\frac{x^2}{16} - \frac{y^2}{9} = 1$, the foci are $(\pm c, 0)$. Find c .

5. Every point satisfying $\frac{x^2}{9} - \frac{y^2}{16} = 1$ has distance to $(-5, 0)$ minus distance to $(5, 0)$ equal to $+6$.
☐ True ☐ False
6. In the original angle-angle example, $A \leftrightarrow A$, $P \leftrightarrow C$, and $Q \leftrightarrow B$. Which gives the small-to-large scale factor?
☐ AP/AC
☐ PQ/AB
☐ AP/AB
☐ AQ/AC
7. A uniform 20% reduction in all lengths reduces the area by exactly 20%.
☐ True ☐ False
8. Two flat plates use the same uniform material and have the same fixed thickness. Both face dimensions of the larger plate are twice those of the smaller. What is the larger-to-smaller mass ratio?

9. Which equation describes points equidistant from $(0, 2)$ and the line $y = -2$?
☐ $x^2 = 8y$
☐ $x^2 + y^2 = 4$
☐ $y^2 = 8x$

☐ $x^2 = -8y$

10. There is a point whose absolute distance difference from $(-5, 0)$ and $(5, 0)$ is 12.

☐ True ☐ False

GRE Subject Test · GRE Mathematics1. **44**

Area scales with the square of the length factor: $1.2^2 = 1.44$, an increase of 44%, not 40%.

2. **0.16**

Length ratio 2 : 5, area 4 : 25.

3. **12**

The correspondence is $P \leftrightarrow C$, so $PQ/CB = AP/AC$. With $AP = 9$, $AC = 15$ and $CB = 20$: $PQ = (9/15) \times 20 = 12$.

4. **5**

For a hyperbola $x^2/a^2 - y^2/b^2 = 1$, $c^2 = a^2 + b^2$ (an ellipse uses $a^2 - b^2$): $c^2 = 16 + 9 = 25$, so $c = 5$.

5. **False**

Points on the left branch give -6 ; squaring lost the sign.

6. AP/AC

AP joins A to the vertex corresponding to C , so it pairs with AC . The other small sides pair with AB and CB .

7. **False**

The remaining area factor is $0.8^2 = 0.64$, so the reduction is 36%.

8. **4**

With density and thickness fixed, mass scales with face area: $2^2 = 4$. Thickness does not scale, so these are not uniformly similar three-dimensional solids.

9. $x^2 = 8y$

Squaring the two nonnegative distances gives $x^2 + (y-2)^2 = (y+2)^2$, hence $x^2 = 8y$.

10. **False**

The reverse triangle inequality bounds the absolute difference by the focal separation, which is 10.