

Similarity and Dilations: math test solutions, Grade 10 – download the PDF

Test solutions with the detailed point scale. Add up your points and spot what to review.

Suggested time: 45 minutes. Out of 20 points. Calculator allowed only when the problem says so.

1 Dilation

/ 3 pts

(a) Multiply each coordinate by 2.5: $A' = (5, 10)$, $B' = (15, -5)$, $C' = (-10, 0)$. (2 pts)

(b) Dilations multiply lengths by k , so $\frac{A'B'}{AB} = 2.5$. Check: $AB = \sqrt{16 + 36} = \sqrt{52}$ and $A'B' = \sqrt{100 + 225} = \sqrt{325} = 2.5\sqrt{52}$. (1 pt)

2 Are they similar?

/ 3 pts

(a) $\frac{10.5}{7} = \frac{15}{10} = \frac{21}{14} = 1.5$: similar by SSS. (1 pt)

(b) Third angles: $180 - 35 - 80 = 65^\circ$ and $180 - 80 - 65 = 35^\circ$. Both have angles $35^\circ, 65^\circ, 80^\circ$: similar by AA. (1 pt)

(c) $\frac{10}{5} = 2$ but $\frac{12}{8} = 1.5$: sides not proportional, so not similar by SAS. (1 pt)

3 Parallel line in a triangle

/ 4 pts

(a) $\frac{8}{12} = \frac{10}{EC}$, so $EC = 15$. (1.5 pts)

(b) $AB = 20$, so $\frac{DE}{BC} = \frac{8}{20}$ and $BC = 14 \cdot \frac{20}{8} = 35$. (1.5 pts)

(c) The scale factor is $\frac{8}{20} = \frac{2}{5}$, so the area ratio is $\frac{4}{25}$. (1 pt)

4 Angle bisector

/ 3 pts

$\frac{BD}{DC} = \frac{15}{10} = \frac{3}{2}$, so BC is split into 5 shares of 4. (1 pt)

$BD = 12$ and $DC = 8$. (1 pt)

Verification: $\frac{12}{8} = \frac{15}{10} = 1.5$ and $12 + 8 = 20$. (1 pt)

5 A tall sign

/ 3 pts

The triangles are similar by AA (same sun angle, right angles). (1 pt)

$\frac{h}{5} = \frac{30}{2} = 15$, so $h = 75$ ft. (1 pt)

$75 \times 0.3048 = 22.86 \approx 22.9$ m. (1 pt)

6 Banners

/ 4 pts

(a) $k = \frac{90}{36} = 2.5$. (1 pt)

(b) $15 \cdot 2.5 = 37.5$ in. (1 pt)

(c) Area ratio = $k^2 = 6.25$. (1 pt)

(d) $48 \cdot 6.25 = 300$ in². (1 pt)



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