

Parallel and Perpendicular Lines: 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 Angles and algebra

/ 4 pts

- (a) Alternate interior angles are congruent: $7x - 4 = 5x + 16$ (1 pt), so $2x = 20$ and $x = 10$ (1 pt).
- (b) $7(10) - 4 = 66$; each angle measures 66° (1 pt). Check: $5(10) + 16 = 66$.
- (c) Same-side interior angles are supplementary: $180^\circ - 66^\circ = 114^\circ$ (1 pt).

2 Prove parallel

/ 3 pts

- (a) $118 + 62 = 180$ (1 pt), so the same-side interior angles are supplementary and, by the converse theorem, $p \parallel q$ (1 pt).
- (b) $118 + 64 = 182 \neq 180$, so the lines are not parallel (1 pt).

3 Slopes of three lines

/ 4 pts

$$m_1 = \frac{-2-4}{1+3} = -\frac{3}{2} \text{ (1 pt). } m_2 = \frac{3-1}{3-0} = \frac{2}{3} \text{ (1 pt). } m_3 = \frac{-1-5}{3+1} = -\frac{3}{2} \text{ (1 pt).}$$

$m_1 \cdot m_2 = -1$, so $\ell_1 \perp \ell_2$. $m_1 = m_3$, and ℓ_1 is $y = -\frac{3}{2}x - \frac{1}{2}$, which gives $y = 1$ at $x = -1$, not 5: the lines are different, so $\ell_1 \parallel \ell_3$ (1 pt).

4 Writing equations

/ 4 pts

(a) Slope $-\frac{3}{4}$ (1 pt). $y + 1 = -\frac{3}{4}(x - 8)$, so $y = -\frac{3}{4}x + 5$ (1 pt). Check: $-6 + 5 = -1$.

(b) Slope $\frac{4}{3}$ (1 pt). $y + 1 = \frac{4}{3}(x - 8)$, so $y = \frac{4}{3}x - \frac{35}{3}$ (1 pt). Check: $\frac{32}{3} - \frac{35}{3} = -1$.

5 Distance to a line

/ 3 pts

Formula: $d = \frac{|Ax_0 + By_0 + C|}{\sqrt{A^2 + B^2}}$ (1 pt). $d = \frac{|3(1) + 4(2) + 5|}{\sqrt{9 + 16}}$ (1 pt) = $\frac{16}{5} = 3.2$ units (1 pt).

6 Perpendicular bisector

/ 2 pts

Midpoint $(2, 2)$ and slope of $\overline{AB}$ equal to $\frac{4}{6} = \frac{2}{3}$ (1 pt). The bisector has slope $-\frac{3}{2}$:
 $y - 2 = -\frac{3}{2}(x - 2)$, that is $y = -\frac{3}{2}x + 5$ (1 pt).



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