

Parallel and Perpendicular Lines

Sheet 1

- 1) The coordinates of P and Q are (2, 6) and (4, 5) respectively. Equation of a line RS is $y = 2x - 3$. Prove that the lines PQ and RS are perpendicular.

- 2) J(-4, 2) is the center of a circle. K(-1, 5) is any point on the circle. A line $y = x + 9$ is a chord of the circle. Prove that the line segment JK is parallel to the chord.

- 3) A line ST passes through (-9, -2) and (-4, -1). Slope of a line UV is $\frac{1}{5}$. Prove that the lines ST and UV are parallel.

- 4) The endpoints of AB are (1, -6) and (5, -6). The equation of a line BC is $y = x - 11$. Is triangle ABC a right triangle? Justify your answer.

- 5) (-9, -6) and (-5, -10) are the endpoints of a chord EF. (-5, -10) and (-1, -6) are the endpoints of a chord GH. Are the chords parallel or perpendicular? Justify.

Parallel and Perpendicular Lines

Sheet 1

- 1) The coordinates of P and Q are (2, 6) and (4, 5) respectively. Equation of a line RS is $y = 2x - 3$. Prove that the lines PQ and RS are perpendicular.

$$\text{slope of PQ} = -\frac{1}{2} ; \text{slope of RS} = 2$$

$$\text{slope of PQ} \times \text{slope of RS} = -1$$

The lines PQ and RS are perpendicular.

- 2) J(-4, 2) is the center of a circle. K(-1, 5) is any point on the circle. A line $y = x + 9$ is a chord of the circle. Prove that the line segment JK is parallel to the chord.

$$\text{slope of JK} = 1$$

$$\text{slope of } y = x + 9 \text{ is } 1$$

The line segment JK is parallel to the chord.

- 3) A line ST passes through (-9, -2) and (-4, -1). Slope of a line UV is $\frac{1}{5}$. Prove that the lines ST and UV are parallel.

$$\text{slope of ST} = \frac{1}{5} ; \text{slope of UV} = \frac{1}{5}$$

$$\text{slope of ST} = \text{slope of UV}$$

The lines ST and UV are parallel.

- 4) The endpoints of AB are (1, -6) and (5, -6). The equation of a line BC is $y = x - 11$. Is triangle ABC a right triangle? Justify your answer.

$$\text{slope of AB} = 0 ; \text{slope of BC} = 1$$

$$\text{slope of AB} \times \text{slope of BC} = 0 \neq -1$$

No. Product of their slopes are not equal to -1, the triangle ABC is not a right triangle.

- 5) (-9, -6) and (-5, -10) are the endpoints of a chord EF. (-5, -10) and (-1, -6) are the endpoints of a chord GH. Are the chords parallel or perpendicular? Justify.

$$\text{slope of EF} = -1 ; \text{slope of GH} = 1$$

$$\text{slope of EF} \times \text{slope of GH} = -1$$

Product of their slopes equals to -1, the chords are perpendicular.

Parallel and Perpendicular Lines

Sheet 2

- 1) $(3, 3)$ and $(7, -1)$ are the endpoints of a chord KL. $(3, -5)$ and $(7, -1)$ are the endpoints of a chord MN. Prove that the chords are perpendicular.

- 2) Equation of a line AB is $y = 7x + 1$. A line CD passes through $(9, -4)$ and $(8, -11)$. Prove that the lines AB and CD are parallel.

- 3) Slope of a line PQ is $\frac{1}{2}$. Is triangle PQR a right triangle? Justify.

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_____). Is triangle PQR a

- 4) $L(2, 1)$ is the center of a circle. Are the line segments

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_____s on the circle. Answer.

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- 5) The coordinates of S and T are $(8, 9)$ and $(6, 5)$ respectively. Equation of a line UV is $2y = 4x - 16$. Prove that the lines ST and UV are parallel.

Parallel and Perpendicular Lines

Sheet 2

- 1) (3, 3) and (7, -1) are the endpoints of a chord KL. (3, -5) and (7, -1) are the endpoints of a chord MN. Prove that the chords are perpendicular.

slope of KL = -1 ; slope of MN = 1

slope of KL \times slope of MN = -1

The chords are perpendicular.

- 2) Equation of a line AB is $y = 7x + 1$. A line CD passes through (9, -4) and (8, -11). Prove that the lines AB and CD are parallel.

slope of AB = 7

slope of AB = slope of CD

The lines AB and CD are parallel.

- 3) Slope of a line PQ is $-\frac{3}{4}$. Slope of a line QR is $\frac{4}{3}$. Is triangle PQR a right triangle? Justify.

slope of PQ = $-\frac{3}{4}$

slope of QR = $\frac{4}{3}$

slope of PQ \times slope of QR = -1

Yes. Product of slopes is -1.

- 4) L(2, 1) is the center of a circle. M(1, 3) and N(3, 3) are points on the circle. Are the line segments LM and LN perpendicular? Justify.

slope of LM = -2

slope of LN = 0

slope of LM \times slope of LN = 0

Yes. Product of slopes is 0.

- 5) The coordinates of S and T are (8, 9) and (6, 5) respectively. Equation of a line UV is $2y = 4x - 16$. Prove that the lines ST and UV are parallel.

slope of ST = 2 ; slope of UV = 2

slope of ST = slope of UV

The lines ST and UV are parallel.

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Is triangle PQR a

Yes. Triangle PQR is a right triangle.

Are the line segments LM and LN perpendicular? Justify.
Answer.

Yes. Line segments LM and LN are perpendicular.

Parallel and Perpendicular Lines

Sheet 3

- 1) Equation of a chord is $3y = 5x + 11$. Endpoints of another chord is $(1, -6)$ and $(4, -1)$. Prove that the chords are parallel.

- 2) A line PQ passes through $(-8, -1)$ and $(-2, 3)$. Equation of a line RS is $-2y = 3x + 13$. Is PQ parallel to RS? Justify.

- 3) $M(2, -7)$ is the centre of a circle. A line $5y = -x - 7$ is a chord of the circle. A line $5y = -x - 7$ is perpendicular to the chord.

- 4) $(-4, 2)$ and $(5, 6)$ are the endpoints of a chord UV. Are they perpendicular? Justify your answer.

- 5) A line EF passes through $(2, 5)$ and $(3, 11)$. Slope of a line GH is 6. Prove that the lines EF and GH are parallel.

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Parallel and Perpendicular Lines

Sheet 3

- 1) Equation of a chord is $3y = 5x + 11$. Endpoints of another chord is $(1, -6)$ and $(4, -1)$. Prove that the chords are parallel.

slope of $3y = 5x + 11$ is $\frac{5}{3}$

slope of chord $(1, -6)$ and $(4, -1)$ is $\frac{5}{3}$

The chords are parallel.

- 2) A line PQ passes through $(-8, -1)$ and $(-2, 3)$. Equation of a line RS is $-2y = 3x + 13$. Is PQ parallel to RS? Justify.

slope of PQ = $\frac{4}{6} = \frac{2}{3}$

slope of RS = $-\frac{3}{2}$

No. As the slopes are not equal, PQ is not parallel to the line RS.

- 3) $M(2, -7)$ is the centre of a circle. A line $5y = -x - 7$ is a chord of the circle. Prove that the line is perpendicular to the chord.

slope of MN = $\frac{1}{2}$

slope of $5y = -x - 7$ is $-\frac{1}{5}$

**Product of the slopes = $\frac{1}{2} \times -\frac{1}{5} = -\frac{1}{10} \neq -1$.
The line is not perpendicular to the chord.**

- 4) $(-4, 2)$ and $(5, 6)$ are the endpoints of a chord ST. Are the chords parallel? Justify your answer.

slope of ST = $\frac{4}{9}$

slope of ST = $\frac{4}{9}$

As the slopes are equal, the chords are parallel.

- 5) A line EF passes through $(2, 5)$ and $(3, 11)$. Slope of a line GH is 6. Prove that the lines EF and GH are parallel.

slope of EF = 6 ; slope of GH = 6

slope of EF = slope of GH

The lines EF and GH are parallel.

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