COORDINATE GEOMETRY: PERPENDICULAR GRADIENTS

Best Guess Mastery Worksheet · Paper 2H

I Do

The point P has coordinates (0, 0).
The point Q has coordinates (16, -2).
The point R has coordinates (k, k + 2).

Angle PRQ is a right angle.
Find all possible values of k.
You must show all your working.

(5)

We Do

The point P has coordinates (-3, 1).
The point Q has coordinates (27, -9).
The point R has coordinates (k, k + 6).

Angle PRQ is a right angle.
Find all possible values of k.
You must show all your working.

(5)

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You Do 1

The point P has coordinates (2, -1).
The point Q has coordinates (24, -5).
The point R has coordinates (k, $k-1$).

Angle PRQ is a right angle.
Find all possible values of k.
You must show all your working.

(5)

You Do 2

The point P has coordinates (-1, 2).
The point Q has coordinates (20, 1).
The point R has coordinates (k, $k+6$).

Angle PRQ is a right angle.
Find all possible values of k.
You must show all your working.

(5)

COORDINATE GEOMETRY: PERPENDICULAR GRADIENTS — ANSWERS

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I Do — Worked Answer

Gradient PR $= (k+2)/(k)$.
Gradient QR $= (k+4)/(k-16)$.

Perpendicular lines have gradient product -1.

$(k+2)(k+4) = -(k)(k-16)$.

Expand and collect: $2k^2 - 10k + 8 = 0$.
Factorise: $2(k-1)(k-4) = 0$.

$k = 1$ or 4.

$k = 1$: R = (1, 3), and the gradient product is -1.
$k = 4$: R = (4, 6), and the gradient product is -1.

We Do — Worked Answer

Gradient PR $= (k+5)/(k+3)$.
Gradient QR $= (k+15)/(k-27)$.

Perpendicular lines have gradient product -1.

$(k+5)(k+15) = -(k+3)(k-27)$.

Expand and collect: $2k^2 - 4k - 6 = 0$.
Factorise: $2(k+1)(k-3) = 0$.

$k = -1$ or 3.

$k = -1$: R = (-1, 5), and the gradient product is -1.
$k = 3$: R = (3, 9), and the gradient product is -1.

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You Do 1 — Worked Answer

Gradient PR $= (k)/(k-2)$.
Gradient QR $= (k+4)/(k-24)$.

Perpendicular lines have gradient product -1.

$(k)(k+4) = -(k-2)(k-24)$.

Expand and collect: $2k^2 - 22k + 48 = 0$.
Factorise: $2(k-3)(k-8) = 0$.

$k = 3$ or 8.

$k = 3$: R = (3, 2), and the gradient product is -1.
$k = 8$: R = (8, 7), and the gradient product is -1.

You Do 2 — Worked Answer

Gradient PR $= (k+4)/(k+1)$.
Gradient QR $= (k+5)/(k-20)$.

Perpendicular lines have gradient product -1.

$(k+4)(k+5) = -(k+1)(k-20)$.

Expand and collect: $2k^2 - 10k + 0 = 0$.
Factorise: $2(k)(k-5) = 0$.

$k = 0$ or 5.

$k = 0$: R = (0, 6), and the gradient product is -1.
$k = 5$: R = (5, 11), and the gradient product is -1.