

1. Find the gradient through (1,2) and (4,8).

2. For $x=2t+1$, find x at $t=3$.

3. Find the horizontal ground distance in the stated flight model.

4. Find the gradient of the line through $(-1,3)$ and $(5,-1)$.

5. Find the radius of $x^2+y^2-4x+2y-20=0$.

6. Perpendicular nonvertical lines always have equal gradients.

☐ True ☐ False

7. Eliminating a parameter always preserves the original domain and direction automatically.

☐ True ☐ False

8. The Cartesian flight curve is a physically valid model for every real x .

☐ True ☐ False

9. Every straight line has a finite gradient and can be written as $y=mx+c$.

☐ True ☐ False

10. A line perpendicular to any radius is automatically a tangent, wherever it crosses the plane.

☐ True ☐ False

1. **2.0**

$$\text{Gradient} = (8-2)/(4-1) = 6/3 = 2.$$

2. **7.0**

$$x = 2 \times 3 + 1 = 7.$$

3. **24.0**

$$y = t(20 - 5t) = 0 \text{ gives } t = 4 \text{ after launch; } x = 6 \times 4 = 24 \text{ m.}$$

4. **-0.6666666666666666**

$$m = (-1 - 3)/(5 - (-1)) = -4/6 = -2/3.$$

5. **5.0**

$$\text{The completed equation has } r^2 = 4 + 1 + 20 = 25, \text{ hence } r = 5.$$

6. **False**

A vertical line has no finite gradient; do not force it into $y = mx + c$. Read the signs of a circle's centre carefully. The radius to a tangent is perpendicular to the tangent.

7. **False**

Writing $y = \sqrt{x}$ from $x = t^2, y = t$ loses the part where t is negative. A Cartesian equation alone does not record direction or the original parameter interval. Squaring can erase a sign restriction.

8. **False**

The flight formula giving negative height after $t = 4$ does not describe continued free flight below the ground. Do not use t measured in minutes with coefficients defined for seconds. In the rectangle model, $t = 0$ is excluded because the width must be positive.

9. **False**

For $ax + by + c = 0$, the gradient is $-a/b$ only if $b \neq 0$. Do not confuse the fixed charge with the price per kilometre. A line fitted to two quoted distances does not prove the same tariff applies at all distances.

10. **False**

Completing a square adds a constant: adjust the other side too. The circle's centre has the opposite signs to the bracket constants. A proposed tangent point must lie on the circle; perpendicularity alone at an unrelated point is insufficient.