HIGHER

# 2.5 Direct and Inverse Proportion With Non-Linear Powers: 30-minute Pack

EDEXCEL 4MA1 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

**Answer all questions. Full sentences are required in 2 questions (where an explanation is asked). Allow 30 minutes.**

**1** y is inversely proportional to the cube of x. When x = 5, y = 5.
Find a formula for y in terms of x.

**(Total for Question 1 is 3 marks)**

---

**2** W is directly proportional to the cube of v.
v is increased by 10%.
Work out the percentage change in W. State whether it is an increase or a decrease.

**(Total for Question 2 is 4 marks)**

---

**3** The time, t seconds, an object takes to fall from rest is directly proportional to the square root of the height, h metres, it falls. It takes 5 seconds to fall 9 m.
Find the time it takes to fall 16 m.

**(Total for Question 3 is 4 marks)**


© Revision Library | revisionlibrary.co.uk

**4** W is directly proportional to the square root of h. When h = 16, W = 8.
Find the positive value of h when W = 10.

**(Total for Question 4 is 4 marks)**

---

**5** F is directly proportional to the cube of d. When d = 7, F = 686.
Find a formula for F in terms of d.

**(Total for Question 5 is 3 marks)**

---

**6** The power P is directly proportional to the square of the voltage V and inversely proportional to the resistance R.
When V = 2 and R = 3, P = 24.
Find the value of P when V = 6 and R = 3.

**(Total for Question 6 is 5 marks)**


© Revision Library | revisionlibrary.co.uk

# Mark scheme · 2.5 Direct and Inverse Proportion With Non-Linear Powers: 30-minute Pack

## Question 1

| | |
|---|---|
| $y = k/x^3$ | **M1** |
| substitutes x = 5, y = 5 and solves for k | **M1** |
| $y = 625/x^3$ | **A1** |

**Answer: $y = 625/x^3$**

## Question 2

| | |
|---|---|
| $W = kv^3$ and the multiplier for v is 1.1 | **M1** |
| applies the same power or root to the multiplier, giving a W multiplier of 1331/1000 | **M1** |
| W multiplier = 1.331 | **A1** |
| 33.1% increase | **A1** |

**Answer: 33.1% increase**

## Question 3

| | |
|---|---|
| $t = k \sqrt{h}$ | **M1** |
| $k = 5/\sqrt{9} = 5/3$ | **M1** |
| $t = 5/3 \times \sqrt{16}$ | **M1** |
| t = 20/3 seconds | **A1** |

**Answer: t = 20/3 seconds**

## Question 4

| | |
|---|---|
| writes $W = k\sqrt{h}$ and substitutes to find k | **M1** |
| k = 2 | **A1** |
| substitutes W = 10 into $W = 2\sqrt{h}$ and rearranges for h | **M1** |
| h = 25 cao | **A1** |

**Answer: h = 25**

## Question 5

| | |
|---|---|
| $F = kd^3$ | **M1** |
| substitutes d = 7, F = 686 and solves for k | **M1** |
| $F = 2d^3$ | **A1** |

**Answer: $F = 2d^3$**

## Question 6

| | |
|---|---|
| $P = kV^2/R$ | **M1** |
| substitutes to get $24 = k \times 4/3$ | **M1** |
| k = 18 | **A1** |
| $P = 18 \times 36/3$ | **M1** |
| P = 216 | **A1** |

**Answer: P = 216**


© Revision Library | revisionlibrary.co.uk