



# CAMI Mathematics: Grade 11

## GRADE 11 Equations with rational exponents

### 11.4 Equations with rational exponents equations

#### 1. Solve for x

(a)  $6x^{\frac{1}{2}} = 18$

(b)  $7x^{\frac{1}{2}} = 42$

(c)  $3x^{\frac{1}{5}} = 6$

(d)  $5x^{\frac{1}{4}} = 30$

(e)  $3x^{\frac{1}{3}} = 15$

#### 2. Solve the equations

(a)  $g^{\frac{3}{4}} = 8$

(b)  $y^{\frac{-3}{2}} = 8$

(c)  $w^{\frac{4}{3}} = 16$

(d)  $v^{\frac{-4}{3}} = 2401$

#### 3. Solve the equations

(a)  $x + 7x^{\frac{1}{2}} - 18 = 0$

(b)  $12v^{\frac{1}{6}} - 6v = 0$

(c)  $x^{\frac{1}{3}} - 10x^{\frac{1}{6}} + 16 = 0$

(d)  $28x^{\frac{1}{2}} + 7x = 0$



## MEMO

### 1. Solve for x [4.9.2.1]

(a)

$$6x^{\frac{1}{2}} = 18$$

$$x^{\frac{1}{2}} = 3$$

$$(x^{\frac{1}{2}})^2 = (3)^2$$

$$\therefore x = 9$$

(b)

$$7x^{\frac{1}{2}} = 42$$

$$x^{\frac{1}{2}} = 6$$

$$(x^{\frac{1}{2}})^2 = (6)^2$$

$$\therefore x = 36$$

(c)

$$3x^{\frac{1}{5}} = 6$$

$$x^{\frac{1}{5}} = 2$$

$$(x^{\frac{1}{5}})^5 = (2)^5$$

$$\therefore x = 32$$

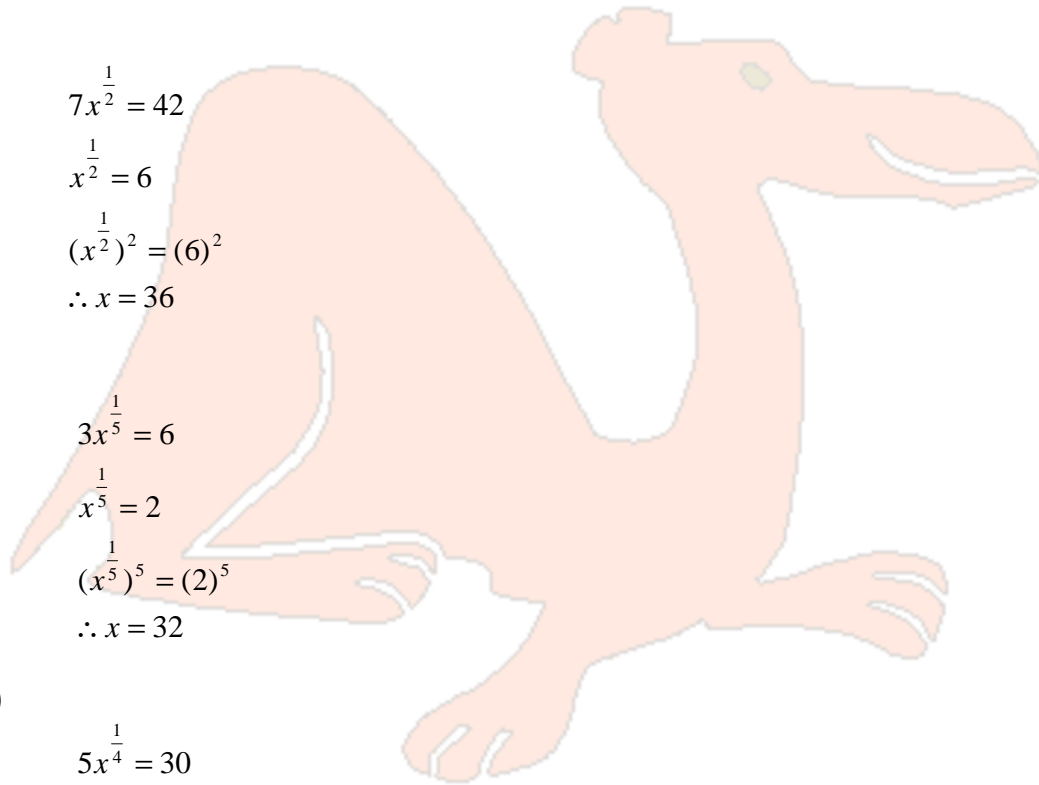
(d)

$$5x^{\frac{1}{4}} = 30$$

$$x^{\frac{1}{4}} = 6$$

$$(x^{\frac{1}{4}})^4 = (6)^4$$

$$\therefore x = 1296$$





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(e)

$$3x^{\frac{1}{3}} = 15$$

$$x^{\frac{1}{3}} = 5$$

$$(x^{\frac{1}{3}})^3 = (5)^3$$

$$\therefore x = 125$$

2. Solve the equations [4.9.2.2]

(a)

$$g^{\frac{3}{4}} = 8$$

$$(g^{\frac{3}{4}})^{\frac{4}{3}} = (2^3)^{\frac{4}{3}}$$

$$\therefore g = 2^4$$

$$\therefore g = 16$$

(b)

$$y^{\frac{-3}{2}} = 8$$

$$4(y^{\frac{-3}{2}})^{\frac{2}{-3}} = (2^3)^{\frac{2}{-3}}$$

$$\therefore y = 2^{-2}$$

$$\therefore y = \frac{1}{4}$$

(c)

$$w^{\frac{4}{3}} = 16$$

$$(w^{\frac{4}{3}})^{\frac{3}{4}} = (2^4)^{\frac{3}{4}}$$

$$\therefore w = 2^3$$

$$\therefore w = 8$$



(d)

$$v^{\frac{-4}{3}} = 2401$$

$$(v^{\frac{-4}{3}})^{-3} = (7^4)^{-3}$$

$$\therefore v = 7^{-3}$$

$$\therefore v = \frac{1}{343}$$

3. Solve the equations [4.9.2.2; 4.9.2.3]

(a)

$$x + 7x^{\frac{1}{2}} - 18 = 0$$

$$(x^{\frac{1}{2}} + 9)(x^{\frac{1}{2}} - 2) = 0$$

$$x^{\frac{1}{2}} \neq -9$$

$$x^{\frac{1}{2}} = 2$$

$$(x^{\frac{1}{2}})^2 = 2^2$$

$$\therefore x = 4$$

(b)

$$12v^{\frac{1}{6}} - 6v = 0$$

$$6v^{\frac{1}{6}}(2 - v^{\frac{5}{6}}) = 0$$

$$6v^{\frac{1}{6}} = 0$$

$$v^{\frac{1}{6}} = 0$$

$$\therefore v = 0$$

or

$$2 - v^{\frac{5}{6}} = 0$$

$$v^{\frac{5}{6}} = 2$$

$$(v^{\frac{5}{6}})^{\frac{6}{5}} = (2)^{\frac{6}{5}}$$

$$v = \sqrt[5]{64}$$



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(c)

$$x^{\frac{1}{3}} - 10x^{\frac{1}{6}} + 16 = 0$$

$$(x^{\frac{1}{6}} - 8)(x^{\frac{1}{6}} - 2) = 0$$

$$x^{\frac{1}{6}} = 8$$

$$(x^{\frac{1}{6}})^6 = (2^3)^6$$

$$\therefore x = 2^{18}$$

or

$$x^{\frac{1}{6}} = 2$$

$$(x^{\frac{1}{6}})^6 = (2)^6$$

$$\therefore x = 64$$

(d)

$$28x^{\frac{1}{2}} + 7x = 0$$

$$7x^{\frac{1}{2}}(4 + x^{\frac{1}{2}}) = 0$$

$$x = 0$$

or

$$4 + x^{\frac{1}{2}} = 0$$

$$x^{\frac{1}{2}} \neq -4$$

