



Exponential equations

1. Solve the following equations.

(a) $81^z = \frac{1}{81}$

(b) $4^v = 1$

(c) $16^v = 2$

2. Solve the following equations.

(a) $3.3^h = 243$

(b) $2.32^h = 128$

(c) $5.625^c = 625$

3. Solve the following equations.

(a) $16^{d-2} \times 16^{d-1} = 1$

(b) $49^{x-2} \times 7^{x+2} = 1$

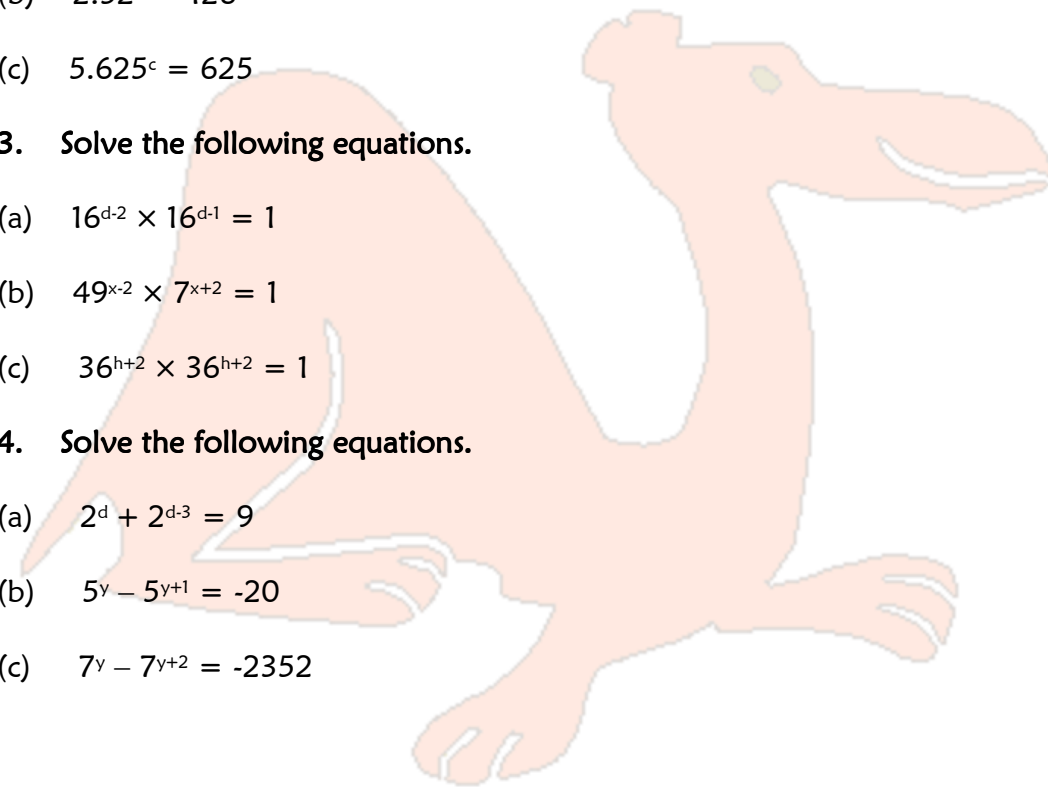
(c) $36^{h+2} \times 36^{h+2} = 1$

4. Solve the following equations.

(a) $2^d + 2^{d-3} = 9$

(b) $5^y - 5^{y+1} = -20$

(c) $7^y - 7^{y+2} = -2352$





MEMO

1. Solve the following equations. [4.9.1.1]

(a) $81^z = \frac{1}{81}$

$$3^{4z} = 3^{-4}$$

$$\therefore 4z = -4$$

$$\therefore z = -1$$

(b) $4^v = 1$

$$4^v = 4^0$$

$$\therefore v = 0$$

(c) $16^v = 2$

$$2^{4v} = 2^1$$

$$\therefore 4v = 1$$

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

2. Solve the following equations. [4.9.1.2]

(a) $3 \cdot 3^h = 243$

$$3^{1+h} = 3^5$$

$$\therefore 1+h = 5$$

$$\therefore h = 4$$

(b) $2 \cdot 32^h = 128$

$$2 \cdot 2^{5h} = 2^7$$

$$2^{1+5h} = 2^7$$

$$\therefore 1+5h = 7$$

$$\therefore 5h = 6$$

$$\therefore h = \frac{6}{5}$$



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(c) $5 \cdot 625^c = 625$

$$625^c = 125$$

$$5^{4c} = 2^3$$

$$\therefore 4c = 3$$

$$\therefore c = \frac{3}{4}$$

3. Solve the following equations. [4.9.1.3]

(a) $16^{d-2} \times 16^{d-1} = 1$

$$16^{d-2+d-1} = 16^0$$

$$\therefore d - 2 + d - 1 = 0$$

$$\therefore 2d - 3 = 0$$

$$\therefore 2d = 3$$

$$\therefore d = \frac{3}{2}$$

(b) $49^{x-2} \times 7^{x+2} = 1$

$$(7^2)^{x-2} \times 7^{x+2} = 7^0$$

$$7^{2x-4} \times 7^{x+2} = 7^0$$

$$7^{3x-2} = 7^0$$

$$\therefore 3x - 2 = 0$$

$$\therefore 3x = 2$$

$$\therefore x = \frac{2}{3}$$

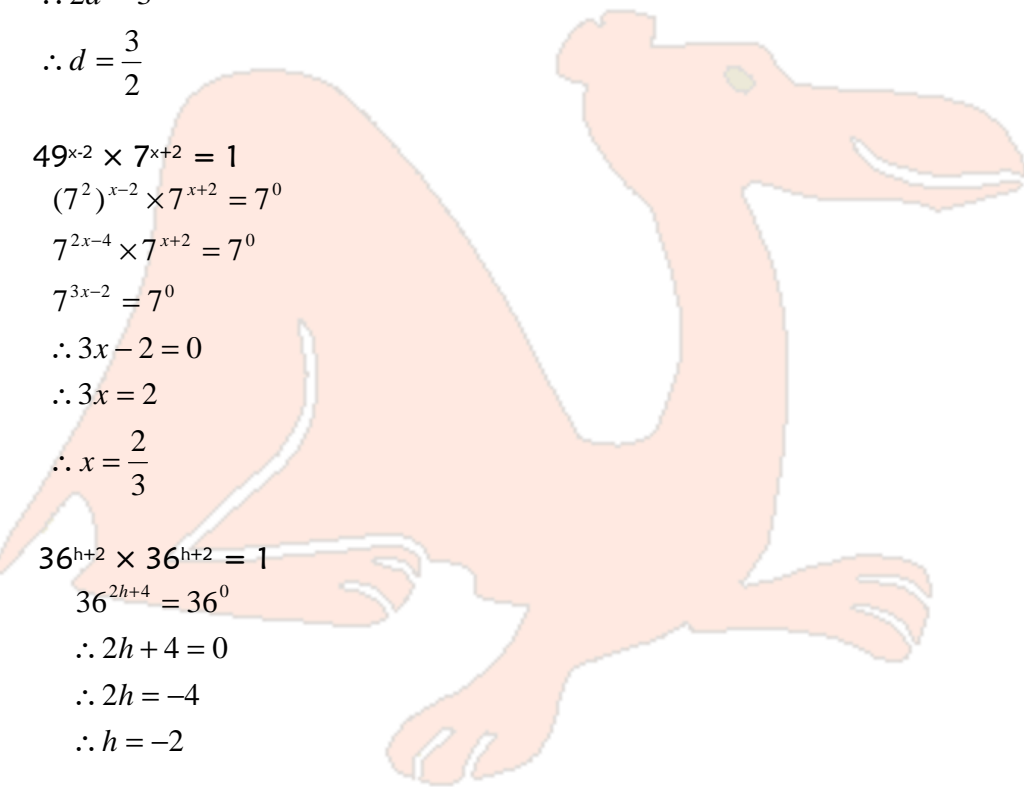
(c) $36^{h+2} \times 36^{h+2} = 1$

$$36^{2h+4} = 36^0$$

$$\therefore 2h + 4 = 0$$

$$\therefore 2h = -4$$

$$\therefore h = -2$$





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4. Solve the following equations. [4.9.1.4]

(a) $2^d + 2^{d-3} = 9$
 $2^d + 2^d \cdot 2^{-3} = 9$
 $2^d (1 + 2^{-3}) = 9$
 $2^d (1 + \frac{1}{8}) = 9$
 $2^d (\frac{9}{8}) = 9$
 $\therefore 2^d = 8$
 $\therefore 2^d = 2^3$
 $\therefore d = 3$

(b) $5^y - 5^{y+1} = -20$
 $5^y (1 - 5) = -20$
 $5^y (-4) = -20$
 $\therefore 5^y = 5$
 $\therefore y = 1$

(c) $7^y - 7^{y+2} = -2352$
 $7^y (1 - 7^2) = -2352$
 $7^y (1 - 49) = -2352$
 $7^y (-48) = -2352$
 $\therefore 7^y = 49$
 $\therefore 7^y = 7^2$
 $\therefore y = 2$

