حــلــول الـتـمــاريــن حــول الـقـــوى

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(9

$$\left(2-3(2-3)^{-1}\right)^{-1} = \left[2-3(-1)^{-1}\right]^{-1}$$

$$= \left[2-3\left(\frac{1}{-1}\right)\right]^{-1}$$

$$= \left[2-3(-1)\right]^{-1}$$

$$= \left[2+3\right]^{-1}$$

$$= 5^{-1}$$

$$= \frac{1}{5}$$

إذن الإجابة الصحيحة هي $\frac{1}{5}$

(10

$$\mathbf{B} = (3\mathbf{x}-7)^2 \qquad \mathbf{A} = (2\mathbf{x}+3)^2$$

$$= (3\mathbf{x})^2 - 2\times 3\mathbf{x}\times 7 + 7^2 \quad = (2\mathbf{x})^2 + 2\times 2\mathbf{x}\times 3 + 3^2$$

$$= 9\mathbf{x}^2 - 42\mathbf{x} + 49 \qquad\qquad = 4\mathbf{x}^2 + 12\mathbf{x} + 9$$

$$\mathbf{D} = (2\mathbf{x}^2+5)(2\mathbf{x}^2-5) \quad \mathbf{C} = \left(\mathbf{x}-\frac{2}{3}\right)\left(\mathbf{x}+\frac{2}{3}\right)$$

$$= (2\mathbf{x}^2)^2 - 5^2 \qquad\qquad = \mathbf{x}^2 - \left(\frac{2}{3}\right)^2$$

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$$(-5)^3 = -125 \quad , \quad (-2)^5 = -32 \quad , \quad 2^3 = 8 \quad \textbf{(1}$$
$$0^{20} = 0 \quad , \quad (-1)^{112} = 1 \quad , \quad 1^{75} = 1$$

$$\mathbf{B} = \left[2\times(-5)\right]^2 \qquad \mathbf{A} = (-2)^3\times(-3)^2 \quad \textbf{(2}$$
$$= (-10)^2 \qquad\qquad = -8\times 9$$
$$= 100 \qquad\qquad = -72$$

$$\mathbf{C} = \left[(-1)^{17}\times(-2)^3\right]^2$$
$$= \left[-1\times(-8)\right]^2$$
$$= 8^2$$
$$= 64$$

$$D = \left[2\times(-3)^2\right]\times\left[4\times(-5)^2\right]^2$$
$$= \left(2\times(-3)^2\right)\times\left(4\times(-5)^2\right)^2$$
$$= (2\times 9)\times(4\times 25)^2$$
$$= 18\times 100^2$$
$$= 180000$$

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$B = \left(\frac{-16\times3^2}{24\times(-3)}\right)^{-1}$ $A = \left(\frac{2}{3}\right)^{-1} \times \left(\frac{-3}{4}\right)^{-1}$ (3

$= \frac{24\times(-3)}{-16\times3^2}$ $= \frac{3}{2}\times\frac{-4}{3}$

$= \frac{-8\times3\times3}{-8\times2\times3\times3}$ $= \frac{-4}{2}$

$= \frac{-1}{-2} = \frac{1}{2}$ $= -2$

$A = (-3)^5 \times (-3)^7 \times (-3)^{-11}$ (4
$= (-3)^{5+7-11}$
$= (-3)^1$
$= -3$

$B = \frac{(-5)^2 \times (25)^{-3}}{5^3 \times (25)^{-2}}$

لاحظ أن $= \frac{(-5)^2 \times \left(5^2\right)^{-3}}{5^3 \times \left(5^2\right)^{-2}}$

$(-5)^2 = 5^2$ و $25 = 5^2$

$= \frac{5^2 \times 5^{-6}}{5^3 \times 5^{-4}}$

$= \frac{5^{2-6}}{5^{3-4}}$

$= \frac{5^{-4}}{5^{-1}}$

$= 5^{-4+1}$

$= 5^{-3}$

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

$= \frac{1}{125}$

$A = \frac{a^2 b^3}{a^3 b^2} = \frac{a^2 b^2 b}{a^2 ab^2} = \frac{b}{a}$ (5

$B = \frac{\left(2a^2\times b^3\right)^3}{\left(3ab^4\right)^2} = \frac{2^3 a^6 b^9}{3^2 a^2 b^8} = \frac{8a^4 b}{9}$

$= 4x^4 - 25$ $= x^2 - \frac{4}{9}$

$x^2 + 8x + 16 = (x+4)^2$ (11
$(3x-2)^2 = 9x^2 - 12x + 4$

$4x^2 - \frac{25}{9} = \left(2x + \frac{5}{3}\right)\left(2x - \frac{5}{3}\right)$

$x^2 + x + \frac{1}{4} = \left(x + \frac{1}{2}\right)^2$

$B = x^2 - \frac{1}{2}x + \frac{1}{16}$ $A = 4a^2 - 49$ (12

$= x^2 - 2.\frac{1}{4}.x + \left(\frac{1}{4}\right)^2$ $= (2a)^2 - 7^2$

$= \left(x - \frac{1}{4}\right)^2$ $= (2a+7)(2a-7)$

$C = (x^2 - 4) + (x-2)(5x+3)$
$= (x-2)(x+2) + (x-2)(5x+3)$
$= (x-2)[(x+2) + (5x+3)]$
$= (x-2)(6x+5)$

$D = 3(x-5)^2 - 2(x^2 - 25)$
$= 3(x-5)(x-5) - 2(x-5)(x+5)$
$= (x-5)[3(x-5) - 2(x+5)]$
$= (x-5)(3x-15-2x-10)$
$= (x-5)(x-25)$

(13 أ) إذا كان n زوجيا فإن : n+1 فردي، ومنه :

$A = (-1)^n + (-1)^{n+1}$
$= 1 + (-1)$
$= 0$

$B = 3^2(-1)^n - (-2)^2(-1)^{n+1}$
$= 3^2 \times 1 - (-2)^2(-1)$
$= 9 + 4$
$= 13$

ب – إذا كان n فرديا فإن n+1 زوجي و منه :

$$A = (-1)^n + (-1)^{n+1}$$
$$= -1 + 1$$
$$= 0$$

$$B = 3^2(-1)^n - (-2)^2(-1)^{n+1}$$
$$= 3^2 \times (-1) - (-2)^2(1)$$
$$= -9 - 4$$
$$= -13$$

ملاحظة : في كلتا الحالتين $A = 0$ ونتيجتي B متقابلتين.

(14 نبسط أولا a و b باستعمال التعميل
$$a = 2^{n-1} + 2^n + 2^{n+1}$$
$$= 2^{n-1}(1 + 2 + 2^2)$$
$$= 2^{n-1}(7)$$
$$= 7 \times 2^{n-1}$$
$$b = 2^{n-2} + 2^{n-1} + 2^n$$
$$= 2^{n-2}(1 + 2 + 2^2)$$
$$= 2^{n-2}(7)$$
$$= 7 \times 2^{n-2}$$
$$a^2 = \left(7 \times 2^{n-1}\right)^2$$
$$= 7^2 \times \left(2^{n-1}\right)^2$$
$$= 49 \times 2^{2n-2}$$
$$b^2 = \left(7 \times 2^{n-2}\right)^2$$
$$= 7^2 \times \left(2^{n-2}\right)^2$$
$$= 49 \times 2^{2n-4}$$
$$c^2 = \left(\sqrt{147} \times 2^{n-2}\right)^2$$
$$= 147 \times 2^{2n-4}$$
و منه $b^2 + c^2 = 49 \times 2^{2n-4} + 147 \times 2^{2n-4}$
$$= (49 + 147)2^{2n-4}$$
$$= 196 \times 2^{2n-4}$$
$$= 49 \times 4 \times 2^{2n-4}$$
$$= 49 \times 2^2 \times 2^{2n-4}$$
$$= 49 \times 2^{2n-2}$$
لدينا $b^2 + c^2 = a^2$ إذن : المثلث ABC قائم الزاوية في A.

(15
$$7 \times 7^{3k}.11 \times 11^{3k}.5^{3k} + 7 \times 11 \times 7^{3k}.11^{3k+1}.5^{3k} + 539 =$$

$$C = \frac{a^2 b^3}{(ab)^3} \div \left(\frac{a^2 b^4}{a^3 b^5}\right)^{-1} = \frac{a^2 b^3}{(ab)^3} \div \frac{a^3 b^5}{a^2 b^4}$$

$$= \frac{a^2 b^3}{a^3 b^3} \times \frac{a^2 b^4}{a^3 b^5} = \frac{a^2 b^3 a^2 b^4}{a^3 b^3 a^3 b^5} = \frac{a^4 b^7}{a^6 b^8} = \frac{1}{a^2 b}$$

(6 $A = (ab)^2\left(\dfrac{a^2}{b^2} + \dfrac{b^2}{a^2}\right)$

$$= a^2 b^2\left(\frac{a^4 + b^4}{a^2 b^2}\right)$$

$$= a^4 + b^4$$

$$B = \frac{\left(ab^3\right)^2}{a^3 b^2}\left[\frac{a}{b^4} + \frac{a^2}{b^3}\right]$$

$$= \frac{a^2 b^6}{a^3 b^2}\left(\frac{a + a^2 b}{b^4}\right)$$

$$= \frac{a^2 b^6(a + a^2 b)}{a^3 b^2 b^4}$$

$$= \frac{a^2 b^6 a(1 + ab)}{a^3 b^6}$$

$$= \frac{a^3 b^6(1 + ab)}{a^3 b^6}$$

$$= 1 + ab$$

(7 $A = 2,3 \times 10^2 + 5,28 \times 10^{-1}$
$$= 230 + 0,528$$
$$= 230,528$$
$$= 2,30528 \times 10^2$$

$$B = \left(53,27 \times 10^{-2}\right) \div 20$$
$$= 0,5327 \div 20$$
$$= 0,026635$$
$$= 2,6635 \times 10^{-2}$$

$$C = \frac{45 \times 10^{-2}}{12 \times 10^{-3}}$$
$$= \frac{45}{12} \times 10^{-2+3}$$
$$= \frac{15}{4} \times 10^1$$
$$= 3,75 \times 10$$

$$\left(x^{-1}+y^{-1}\right)^{-1} = \left(\frac{1}{x}+\frac{1}{y}\right)^{-1} \qquad (8$$

$$= \left(\frac{y+x}{xy}\right)^{-1}$$

$$= \left(\frac{x+y}{xy}\right)^{-1}$$

$$= \frac{xy}{x+y}$$

إذن الإجابة الصحيحة هي $\dfrac{xy}{x+y}$

$$= 7 \times 11 \times \left(7^{3k}.11^{3k}.5^{3k}+7\right)$$

$$= 77\left(7 \times 7^{3k-1}.11^{3k}.5^{3k}+7\right)$$

$$= 77 \times 7\left(7^{3k-1}.11^{3k}.5^{3k}+1\right)$$

$$= 539\left(7^{3k-1}.11^{3k}.5^{3k}+1\right)$$

وبملاحظة أن $7^{3k-1}.11^{3k}.5^{3k}$ عدد فردي (جداء أعداد فردية) فإن $7^{3k-1}.11^{3k}.5^{3k}+1$ عدد زوجي أي $7^{3k+1}.11^{3k+1}.5^{3k}+539 = 539(2k')$ ($k' \in \mathbb{Z}$)

$$= 1078k'$$

إذن $7^{3k+1}.11^{3k+1}.5^{3k}+539$ مضاعف للعدد 1078