

Q14

$$\frac{x^2 z^2 y^3 x}{y^2 z^4 z^4 x^2 y}$$

fractions

①

• multiply $\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$

• dividing $\frac{\frac{a}{b}}{\frac{c}{d}} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$

• addition $\frac{a \times d}{b \times d} + \frac{c \times b}{d \times b} = \frac{ad+cb}{bd}$

Q14

powers:

$$x = x^1$$

$$1 = x^0$$

$$x^{-a} = \frac{1}{x^a}$$

$$\frac{x^3}{1} \times \frac{x^{-3}}{x^{-3}} = \frac{x^0}{x^{-3}} = \frac{1}{x^{-3}}$$

$$\frac{x^2 z^2}{y^2 x^4} \cdot \frac{y^3 x}{z^4 x^2 y} = \frac{(x^2 z^2 y^3 x)}{y^2 (x^4 z^4 x^2) y}$$

$$x^2 x^1 = x^3 \quad (2)$$

$$x^4 x^2 = x^6$$

$$\frac{x^3 z^2 y^3}{(y^2 x^6 z^4 y^1)} = \frac{(x^3 z^2 y^3)}{x^{-3} y^3 x^6 z^4}$$

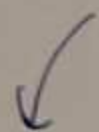
$$= \frac{z^2 y^3}{x^{-3} x^6 y^3 z^4} = \frac{z^2 y^3}{x^3 y^3 z^4} \times x^{-3}$$

$$= \frac{z^2 \times z^{-2}}{x^3 z^4 \times z^{-2}} = \boxed{\frac{1}{x^3 z^2}}$$

③

$$\underline{Q5} \quad 3\left(\frac{1}{3} + 2\right) - 5\left(\frac{4}{5} - 3\right)$$

add



multiply out

$$\left[\frac{3}{1} \times \frac{1}{3} = \frac{3}{3} = 1 \right]$$

$$3\left(\frac{1}{3} + \frac{2 \times 3}{1 \times 3}\right)$$

$$3 \times \frac{1}{3} + 3 \times 2$$

$$1 + 6$$

try multiply first

$$3\left(\frac{1}{3} + \frac{6}{3}\right)$$

$$7 - 5\left(\frac{4}{5} - 3\right)$$

$$3 \times \frac{7}{3}$$

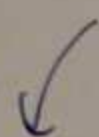
$$7 - \frac{5}{1} \times \frac{4}{5} - 5 \times -3$$

$$\underline{7 - 4} + 15 = 12$$

Q5 $3\left(\frac{1}{3} + 2\right) - 5\left(\frac{4}{5} - 3\right)$

③

add



multiply out

$$\left[\frac{3}{1} \times \frac{1}{3} = \frac{3}{3} = 1 \right]$$

$$3\left(\frac{1}{3} + \frac{2 \times 3}{1 \times 3}\right)$$

$$3 \times \frac{1}{3} + 3 \times 2$$

$$1 + 6$$

try multiply first

$$3\left(\frac{1}{3} + \frac{6}{3}\right)$$

$$7 - 5\left(\frac{4}{5} - 3\right)$$

$$3 \times \frac{7}{3}$$

$$7 - \frac{8}{1} \times \frac{4}{5} - 5 \times -3$$

$$7 - 4 + 15 = 18$$

Q8 $\frac{2 \times 6}{2 \times 11} + \frac{1 \times 11}{2 \times 11}$

$\frac{2 \times 4}{2 \times 7} - \frac{3 \times 7}{2 \times 7}$

$\frac{12}{22} + \frac{11}{22}$

$\frac{8}{14} - \frac{21}{14}$

$\frac{23}{22}$

$-\frac{13}{14}$

$\frac{23}{22} \times \frac{14}{-13} = - \frac{23 \times 14 / 2}{\cancel{22} \times 13} = - \frac{322}{286}$

$= - \frac{23 \times 7}{11 \times 13} = - \frac{161}{143}$

(4)

Q9 $\frac{x/y}{y/x}$

$$\frac{x}{y} \times \frac{x}{y}$$

$$\frac{x^2}{y^2}$$

Q10 $\frac{b \times 1}{b \times a} - \frac{1 \times a}{b \times a}$

$$\frac{b}{ab} - \frac{a}{ba}$$

$$\frac{b-a}{ab}$$

$$a \times b = ab$$

$$ab = ba$$

(5)

$$5(x^2+5)^4(2x)(x-2)^4 + (x^2+5)^5(4)(x-2)^3 \textcircled{6}$$

$$(x^2+5)^4$$

Example

$$ab + ac$$

$$a(b+c)$$

$$a^3b + a^4c$$

$$a^3(b+ac)$$

$$5(x^2+5)^4(2x)(x-2)^4 + (x^2+5)^5(4)(x-2)^3 \quad (7)$$

$$(x^2+5)^4 \left[5(2x)(x-2)^4 + (x^2+5)^1(4)(x-2)^3 \right]$$

$$(x^2+5)^4 (x-2)^3 \left[5(2x)(x-2)^1 + (x^2+5)4 \right]$$

$$10x(x-2)$$

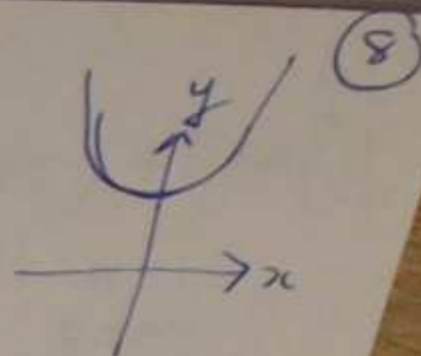
$$+ 4x^2 + 20$$

$$10x^2 - 20x$$

$$(x^2+5)^4 (x-2)^3 (14x^2 - 20x + 20)$$

$$(x^2+5)^4 (x-2)^3 2(7x^2 - 10x + 10)$$

$$(x^2+5)^4 (x-2)^3 2 (7x^2-10x+10)$$



check use
quadratic formula.

$$ax^2 + bx + c$$

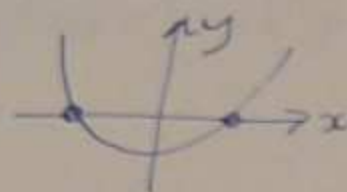
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$b^2 - 4ac$$

$$= 100 - 4 \times 7 \times 10$$

$$100 - 280 = -180 < 0$$

$$\begin{matrix} 7 & 1 & 10 & 5 \\ 1 & 2 & 1 & 2 \end{matrix}$$



$$\frac{a+b}{c}$$

$\equiv$

$$a+b/c = a + \frac{b}{c}$$

$$(a+b)/c$$

$$\frac{a+b}{c+d} = (a+b)/(c+d)$$

order of operations.

PEMDAS

⑨

Q20

(10)

$$\frac{x^3 y^{-7}}{y^4 x^{-3}} = \frac{x^3 \cdot x^3}{y^4 \cdot y^7} = \frac{x^6}{y^{11}}$$

Diagram showing the conversion of negative exponents to positive exponents in the denominator:

$$\frac{x^3 \cancel{y^{-7}}}{y^4 \cancel{x^{-3}}} = \frac{x^3 \cdot x^3}{y^4 \cdot y^7}$$

$$\frac{x^3 \frac{1}{y^7}}{y^4 \frac{1}{x^3}} = \frac{\frac{x^3}{y^7}}{\frac{y^4}{x^3}} = \frac{x^3}{y^7} \times \frac{x^3}{y^4} = \frac{x^6}{y^{11}}$$

$$\frac{1}{x^{-3}} = \frac{1}{\frac{1}{x^3}} = 1 \times \frac{x^3}{1} = x^3$$

fractional powers

$$x^a x^b = x^{a+b} \quad (11)$$

$$2^2 \times 2^3 = (2 \times 2) \times (2 \times 2 \times 2) = 2^5$$

$$(2^2)^2 = (2 \times 2)^2 = (2 \times 2) \times (2 \times 2)$$

$$(x^a)^b = x^{ab}$$

$$\sqrt{2} \times \sqrt{2} = 2$$

$$Q: \sqrt{2} = 2^a$$

$$2^a \times 2^a = 2^1$$

$$2^{(2a)} = 2^{(1)}$$

$$2a = 1$$

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

$$\sqrt{2} = 2^{1/2}$$

$$\sqrt{x} = x^{1/2}$$

$$\sqrt{ab} = \sqrt{a}\sqrt{b}$$

(12)

$$\sqrt[n]{x} = x^{1/n}$$

$$\frac{\sqrt{x^2 y}}{\sqrt{1/x}}$$

(*)

$$\begin{aligned} (*) &= \frac{\sqrt{x^2} \sqrt{y}}{1/\sqrt{x}} = \frac{(x^2)^{1/2} y^{1/2}}{x^{-1/2}} \times \cancel{\sqrt{x}} x^{1/2} \\ &= \frac{x^{1/2} y^{1/2} x^{1/2}}{x^{-1/2}} \\ &= x^{3/2} y^{1/2} \end{aligned}$$

$$1 + \frac{1}{2} = \frac{3}{2}$$

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$$x\sqrt{x} = x^1 \cdot x^{1/2}$$

$$x^a \cdot x^b = x^{a+b}$$

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

$$\frac{1 \times 2 + 1}{1 \times 2}$$

$$= x^{3/2}$$

$$\frac{2}{2} + \frac{1}{2}$$

$$\frac{3}{2}$$