

Entrance to Grade 12 Mathematics for College Technology (MCT4C)

Scrap paper is available but write your final solution clearly in the space provided

$$\begin{aligned}
 A &= P(1+i)^n \\
 &= 2500\left(1 + \frac{0.04}{12}\right)^{48} \\
 &= 2933.00
 \end{aligned}$$

[1] Mary will have \$2933.00 four years later.

a. $3^x + 6 = 87$

$$3^x = 81$$

$$3^x = 3^4$$

$$x = 4$$

c. $4^{x+1} - 22 = 42$

$$4^{x+1} = 64$$

$$4^{x+1} = 4^3$$

$$x + 1 = 3$$

$$x = 2$$

b. $5(2^x) - 160 = 0$

$$2^x - 32 = 0$$

$$2^x = 2^5$$

$$x = 5$$

d. $\frac{3^{x-1}}{6} = \frac{81}{2}$

$$3^{x-1} = 243$$

$$3^{x-1} = 3^5$$

$$x - 1 = 5$$

$$x = 6$$

[2] _____

a. $x^2 + 3x - 4 - (x^2 - 2x + 1)$

$$= x^2 + 3x - 4 - x^2 + 2x - 1$$

$$= 5x - 5$$

c. $x^2 + 6x + 9 - 2x - 2$

$$= x^2 + 4x + 7$$

b. $2(x^2 - x + 3x - 3)$

$$= 2x^2 + 4x - 6$$

d. $4x^2 + 12x + 9 - 3(x^2 + 4x + 4)$

$$= 4x^2 + 12x + 9 - 3x^2 - 12x - 12$$

$$= x^2 - 3$$

[3] _____

a. no restrictions

c. $x \neq 5$

[4] b. $y \neq 3, 4$

d. $y \neq -5, 3$

a. $\frac{(2x^2y)^3}{4x^3y^4} = \frac{8x^6y^3}{4x^3y^4}$

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

c. $(4xy^2)^{\frac{1}{2}}(9x^3y^4)^{\frac{1}{2}} = (36x^4y^6)^{\frac{1}{2}}$

$$= 6x^2y^3$$

b. $(2x^2y)^3(3x^2y^4)^{-2} = \frac{8x^6y^3}{9x^4y^8}$

$$= \frac{8x^2}{9y^5}$$

d. $\frac{3x^2y^4}{15(xy^2)^3} = \frac{3x^2y^4}{15x^3y^6}$

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

[5] _____

a. $x^2 + 81 = 0$

$$x^2 = -81$$

$$x = \pm\sqrt{-81}$$

$$= \pm 9i$$

c. $x^2 + 15 = -12$

$$x^2 = -27$$

$$x = \pm\sqrt{-27}$$

$$= \pm 3\sqrt{3}i$$

b. $3(x-3)^2 = x^2 - 3$

$$3(x^2 - 6x + 9) = x^2 - 3$$

$$3x^2 - 18x + 27 = x^2 - 3$$

$$2x^2 - 18x + 30 = 0$$

$$x^2 - 9x + 15 = 0$$

$$x = \frac{9 \pm \sqrt{21}}{2}$$

[6]

d. $(x+2)(x+5) = (x-4)^2$

$$x^2 + 7x + 10 = x^2 - 8x + 16$$

$$15x = 6$$

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

[7]

a. $330^\circ = 330 \times \frac{\pi}{180} = \frac{11}{6}\pi$

b. $48^\circ = 48 \times \frac{\pi}{180} = \frac{4}{15}\pi$

c. $-510^\circ = -510 \times \frac{\pi}{180} = -\frac{17}{6}\pi$

a. $\frac{m^{2a+3} \cdot m^{a-2}}{m^{a+1} \cdot m^{a-1}} = \frac{m^{3a+1}}{m^{2a}} = m^{a+1}$

b. $\sqrt{\frac{a^{\frac{1}{4}} \cdot a^{\frac{1}{2}}}{\sqrt{a}}} = \left(\frac{a^{\frac{1}{4}} \cdot a^{\frac{1}{2}}}{a^{\frac{1}{2}}} \right)^{\frac{1}{2}}$

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

$$= a^{\frac{1}{8}}$$

[8]
