

$$\begin{aligned}
 1. \quad \frac{\sqrt[4]{400}}{\sqrt{5}} &= \sqrt[4]{\frac{400}{5}} = \sqrt[4]{80} \\
 &= \sqrt[4]{16 \times 5} \\
 &= 2\sqrt[4]{5}
 \end{aligned}$$

$$2. \quad y = -2x^2 + 2x + 2$$

$$y = ax^2 + bx + c$$

$$\text{Vertex form} \Rightarrow y = a(x-h)^2 + k$$

$$h = \frac{-b}{2a} = \frac{-2}{2(-2)} = \frac{1}{2}$$

$$\begin{aligned}
 k = y\left(\frac{1}{2}\right) &= -2\left(\frac{1}{2}\right)^2 + 2\left(\frac{1}{2}\right) + 2 \\
 &= \frac{5}{2}
 \end{aligned}$$

$$\text{Vertex} = \left(\frac{1}{2}, \frac{5}{2}\right)$$

$$y(6) = -2(6)^2 + 2(6) + 2 = -58$$

$$3. \quad V = L^3$$

$$= (5a + 4b)^3$$

$$= (5a + 4b)(5a + 4b)(5a + 4b) = (25a^2 + 40ab + 16b^2)(5a + 4b)$$

$$= 125a^3 + 300a^2b + 240ab^2 + 64b^3$$

4.

$$\text{Function} = f(x+4)$$

5.

$$R(x) = 12x$$

$$C(x) = 20 + 8x$$

$$\text{Profit} = R(x) - C(x)$$

$$12x - (20 + 8x) \geq 100$$

$$12x - 20 - 8x \geq 100$$

$$4x - 20 \geq 100$$

$$4x \geq 120$$

$$x \geq 30 \text{ t-shirts}$$

$$6. \text{ Velocity} = 20\sqrt{273+t}$$

$$329 = 20\sqrt{273+t}$$

$$273+t = \left(\frac{329}{20}\right)^2$$

$$t = \left(\frac{329}{20}\right)^2 - 273$$

$$t = -2^\circ\text{C}$$

$$7. \quad V(x) = x^3 - 6x^2 + 8x \quad W = x - 2$$

$$\begin{array}{r} x^2 - 4x \\ x-2 \overline{) x^3 - 6x^2 + 8x} \\ \underline{x^3 - 2x^2} \\ -4x^2 + 8x \\ \underline{-4x^2 + 8x} \\ 0 \end{array}$$

$$= (x-2)(x^2 - 4x)$$

$$x^2 - 4x = x(x-4)$$

$$V(x) = x(x-4)(x-2)$$

$$\text{Length} = x$$

$$\text{Height} = x - 4$$

$$8. \quad \sqrt{2x+8} - 6 = 4$$

$$\sqrt{2x+8} = 10$$

$$2x+8 = 10^2$$

$$2x = 100 - 8$$

$$2x = 92$$

$$x = 46$$

$$9. \quad |4x+3| = 9+2x$$

$$4x+3 = 9+2x \quad \text{or} \quad 4x+3 = -9-2x$$

$$2x = 6$$

$$x = 3$$

$$6x = -12$$

$$x = -2$$

$$x = -2 \text{ or } 3$$

$$10. V = \pi r^2 h$$

$$r = x$$

$$h = x + 7$$

$$V = \pi (x)^2 (x + 7)$$

$$= \pi (x^3 + 7x^2) \text{ in}^3$$

$$11. \log_{81} 3 = x$$

$$81^x = 3$$

$$(3^4)^x = 3^1$$

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

$$4x = 1$$

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

$$12. y = ax^2 + bx + c$$

$$a(0)^2 + b(0) + c = 5.1 \rightarrow c = 5.1$$

$$a(1)^2 + b(1) + c = 3.03 \quad a + b + 5.1 = 3.03$$

$$a + b = 3.03 - 5.1$$

$$a + b = -2.07$$

$$a(2)^2 + b(2) + c = 1.73 \quad 4a + 2b + 5.1 = 1.73$$

$$4a + 2b = -3.38$$

$$a + b = -2.07$$

$$4a + 2b = -3.38$$

$$4(-2.07 - b) + 2b = -3.38$$

$$-8.28 - 4b + 2b = -3.38$$

$$-2b = 4.9$$

$$b = -2.45$$

$$a + (-2.45) = -2.07$$

$$a = -2.07 + 2.45 = 0.38$$

$$y = 0.38x^2 - 2.45x + 5.1$$

$$13. \quad y = 0.38x^2 - 2.45x + 5.1$$

$$x = 9$$

$$y = 0.38(9)^2 - 2.45(9) + 5.1$$

$$= 1.3.83 \text{ thousand}$$

$$14. \quad \frac{4(3b-6)}{1+b} ; h = -2$$

$$\frac{4(3(-2)-6)}{1+(-2)} = 48$$

$$15. \quad y = ax^2 + bx + c$$

$$a(-2)^2 + b(-2) + c = -20 \rightarrow 4a - 2b + c = -20$$

$$a(0)^2 + b(0) + c = -4 \rightarrow c = -4$$

$$a(4)^2 + b(4) + c = -20 \rightarrow 16a + 4b + c = -20$$

$$4a - 2b - 4 = -20 \rightarrow 4a - 2b = -16 \quad \dots (i)$$

$$16a + 4b - 4 = -20 \rightarrow 16a + 4b = -16 \quad \dots (ii)$$

$$\begin{aligned} 2(4a - 2b) &= -16 \\ 16a + 4b &= -16 \end{aligned}$$

$$\begin{aligned} 8a - 4b &= -32 \\ + 16a + 4b &= -16 \\ \hline 24a &= -48 \\ a &= -2 \end{aligned}$$

$$\begin{aligned} 4(-2) - 2b &= -16 \\ -8 - 2b &= -16 \\ -2b &= -8 \\ b &= 4 \end{aligned}$$

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

16. $-1 - 13 = -13$

17. Big square, $A = x^2$
Small square, $A = 3^2 = 9$

Remaining area = $x^2 - 9$

$$= (x-3)(x+3)$$

18. It is a function since there are x -values that have been repeated

19. $\sqrt{7x}(\sqrt{x} - 7\sqrt{7}) = \sqrt{7x^2} - 7\sqrt{49x}$
 $= x\sqrt{7} - 7(7\sqrt{x})$
 $= x\sqrt{7} - 49\sqrt{x}$

20. Leading term = $-3x^5$

End behaviour = Rises on the left and falls on the right