

More review

Chap 1 Test p. 181

Powers of i :

$i^0 = 1$	$i^4 = i^2 \cdot i^2 = (-1)(-1) = 1$	$i^8 = 1$
$i^1 = i$	$i^5 = i^4 \cdot i^1 = 1 \cdot i = i$	etc.
$i^2 = -1$	$i^6 = i^4 \cdot i^2 = 1 \cdot (-1) = -1$	
$i^3 = -i$	$i^7 = i^4 \cdot i^3 = 1 \cdot (-i) = -i$	

$$17 a) \quad i^{42} = i^{40} \cdot i^2 = 1 \cdot (-1) = \boxed{-1}$$

$$b) \quad i^{-31} = i^{-31} \cdot 1 = i^{-31} \cdot i^{32} = i^{-31+32} = i^1 = \boxed{i}$$

$$c) \quad \frac{1}{i^{19}} = \frac{1}{i^{19}} \cdot 1 = \frac{1}{i^{19}} \cdot i^{20} = \frac{i^{20}}{i^{19}} = i^{20-19} = i^1 = \boxed{i}$$

$$11) \quad x^4 - 17x^2 + 16 = 0$$

$$(x^2)^2 - 17x^2 + 16 = 0$$

Let $u = x^2$:

$$u^2 - 17u + 16 = 0$$

$$(u - 1)(u - 16) = 0$$

$$(x^2 - 1)(x^2 - 16) = 0$$

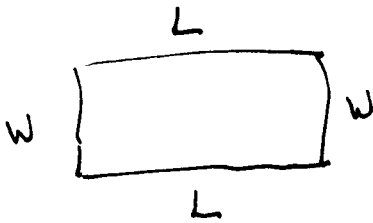
$$(x - 1)(x + 1)(x - 4)(x + 4) = 0$$

Solutions: $\boxed{1}$, $\boxed{-1}$, $\boxed{4}$, $\boxed{-4}$

Why? Because $x - 1 = 0$ or $x + 1 = 0$ or $x - 4 = 0$ or $x + 4 = 0$
by the "zero factor property"

So $x = 1$ or $x = -1$ or $x = 4$ or $x = -4$

- 19) the perimeter of a rectangle is 620 m.
 The length is 20 m less than ^{twice} the width.
 What are the length and width.



Let $L = \text{length}$ $W = \text{width}$

$$\begin{cases} 2L + 2W = 620 \text{ m} \\ L = 2W - 20 \end{cases}$$

Substitute: $2(2W - 20) + 2W = 620$

Intent: To go
 from 2 eqns/2 vars
 to 1 eqn/1 variable

$$4W - 40 + 2W = 620$$

$$6W - 40 = 620$$

$$6W = 660$$

$$W = 110 \text{ m}$$

$$L = 2(110) - 20 = 200 \text{ m}$$

Check: $2(200) + 2(110) = 620 \text{ m}$ correct perimeter

$$200 = 2(110) - 20 \quad \text{also correct}$$

- 23) A projectile's height, s in feet, depends on the time, t in seconds, since launched as

$$s = -16t^2 + 96t$$

- a) At what time(s) will it reach a height of 80 ft?

Set $s = 80$, then solve for t :

$$80 = -16t^2 + 96t$$

$$16t^2 - 96t + 80 = 0$$

$$16(t^2 - 6t + 5) = 0$$

$$16(t-1)(t-5) = 0$$

$$~~16=0~~ \text{ or } t-1=0 \text{ or } t-5=0$$

$$\boxed{t=1 \text{ second}} \text{ or } \boxed{t=5 \text{ seconds}}$$

- b) After how many seconds does it ^{return to} reach the ground?

Solve $0 = -16t^2 + 96t$

$$0 = -16t(t-6)$$

$$t=0$$

$$\text{or } t-6=0$$

$$\boxed{t=6 \text{ seconds}}$$