

## Warm up

Sum of Cubes

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$$

$$x^6 + 27$$

$$(x^3 + 3)(x^4 - 3x^3 + 9)$$

Difference of Cubes

$$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

$$8x^3 - 64y^3$$

$$8(x^3 - 8y^3)$$

$$8(x - 2y)(x^2 + 2xy + 4y^2)$$

### Questions From Homework

② ⚡,  $(x^5 - 5x^4)(10x^3 + 50x^2)(9x - 45)$

 $x^4(x-5) - 10x^3(x-5) + 9(x-5)$ 
 $(x-5)(x^4 - 10x^3 + 9)$  ← simple trinomial  $\begin{array}{l} -1 \\ \times -9 = 9 \\ -1 + -9 = -10 \end{array}$ 
 $(x-5)(x^3 - 9)(x^3 - 1)$  ← diff. of squares
  $(x-5)(x-3)(x+3)(x-1)(x+1)$

## Factor Theorem

### Factor Theorem

$(x-b)$  is a factor of  $f(x)$  if and only if  $f(b) = 0$ .

**Hint: Find a value of "x" that will make it = 0**

$$\begin{array}{rcl} x^3 + 5x^2 - 2x - 24 & & x = 2 \\ (2)^3 + 5(2)^2 - 2(2) - 24 & & (x-2) = 0 \\ 8 + 20 - 4 - 24 & & \\ \hline 0 & & \end{array}$$

$(x - 2)$  is a factor

Use long division to find another factor:

$$\begin{array}{r}
 \overline{x^3 + 7x^2 + 12} \\
 x-2 \quad \overline{\underline{- (x^3 - 2x^2)}} \\
 \underline{7x^2 - 2x - 24} \\
 \underline{- (\underline{7x^2 - 14x})} \\
 \underline{\underline{12x - 24}} \\
 \underline{- (\underline{12x - 24})} \\
 0
 \end{array}$$

trinomial  
 $(x-2)(x^2+7x+12)$   
 $(x-2)(x+4)(x+3)$

Factor further (if possible):

## Factor Theorem

### Factor Theorem

$(x-b)$  is a factor of  $f(x)$  if and only if  $f(b) = 0$ .

$$P(x) = 2x^3 - 5x^2 - 4x + 3$$

$$\begin{array}{r} 2(-1)^3 - 5(-1)^2 - 4(-1) + 3 \\ -2 - 5 + 4 + 3 \\ \hline 0 \end{array}$$

$$x = -1$$

$$x+1 = 0$$

$(x+1)$  is a factor

$$\begin{array}{r} 2x^3 - 7x + 3 \\ \underline{x+1} \overline{)2x^3 - 5x^2 - 4x + 3} \\ - (2x^3 + 2x^2) \\ \hline -7x^2 - 4x + 3 \\ - (-7x^2 - 7x) \\ \hline 3x + 3 \\ - (3x + 3) \\ \hline 0 \end{array}$$

decomposition

$$(x+1)(2x^2 - 7x + 3)$$

$$(x+1)(x-\frac{1}{2})(x-\frac{6}{2})$$

$$(x+1)(2x-1)(x-3)$$

# Homework

# 3

b)  $x^3 + 0x^2 - 7x + 6$

## Answers to short sheet

**CHAPTER 1 LIMITS AND RATES OF CHANGE**

**REVIEW AND PREVIEW TO CHAPTER 1**

**EXERCISE 1**

1. (a)  $(x - 2)(x + 1)$    (b)  $(x - 2)(x - 7)$   
     (c)  $(x + 3)(x + 4)$    (d)  $(2x + 1)(x - 1)$   
     (e)  $(5x + 3)(x + 2)$    (f)  $(3y - 1)(2y - 3)$   
     (g)  $t(t - 1)(t + 3)$    (h)  $x^2(3x + 1)(x + 2)$

2. (a)  $(2x + 5)(2x - 5)$   
     (b)  $(x - 1)(x^2 + x + 1)$   
     (c)  $(t + 4)(t^2 - 4t + 16)$   
     (d)  $y(y + 3)(y - 3)$   
     (e)  $(2c - 3d)(4c^2 + 6cd + 9d^2)$   
     (f)  $(x^2 + 2)(x^4 - 2x^2 + 4)$   
     (g)  $(x + 2)(x - 2)(x^2 + 4)$   
     (h)  $(r + 1)(r - 1)(r^2 + 1)(r^4 + 1)$

3. (a)  $(x + 4)(x - 4)(x - 1)$   
     (b)  $(x - 1)(x + 3)(x - 2)$   
     (c)  $(x - 2)(x + 3)(x + 4)$   
     (d)  $(x - 3)(x + 1)(x + 4)$   
     (e)  $(x + 2)(2x - 1)(2x + 3)$   
     (f)  $(x + 3)(x - 3)(x - 2)(x - 1)$

4. (a)  $x^{\frac{1}{2}}(x - 1)(x + 1)$    (b)  $x^{-\frac{1}{2}}(x + 2)(x + 3)$   
     (c)  $x^{-\frac{1}{2}}(x + 4)(x - 2)$   
     (d)  $2x^{\frac{1}{2}}(x - 1)(x^2 + x + 1)$   
     (e)  $x^{-\frac{1}{2}}(x + 1)^2$    (f)  $(x^2 + 1)^{-\frac{1}{2}}(x^2 + 4)$

**EXERCISE 2**