**Factor Theorem and Algebraic Division GREEN**

1. a) Divide x³ + 6x² + 8x + 3 by (x + 1) b) Divide x³ - 5x² - 6x – 56 by (x – 7)

 c) Divide 4x³ + 9x²- 3x – 10 by (x + 2) d) Divide -5x³ - 27x² + 23x + 30 by (x + 6)

2. a) Divide 3x4 + 8x³ - 11x² + 2x + 8 by (3x + 2)

 b) Divide 21x5 + 29x4 – 10x³ + 42x – 12 by (7x – 2)

 c) Divide 2x³ + 9x² + 25 by (x + 5)

3. a) Find the remainder when x³ + 4x² - 3x + 2 is divided by (x + 5)

 b) Find the remainder when -2x³ + 3x² + 12x + 20 is divided by (x - 4)

4. a) Show that (x – 1) is a factor of x³ + 6x² + 5x – 12 and hence factorise the expression completely

 b) Show that (x – 5) is a factor of x³ - 7x² + 2x + 40 and hence factorise the expression completely

5. Fully factorise the right hand side of each equation and hence sketch the graphs, showing all intercepts with axes

 a) y = 2x³ + 5x² - 4x – 3 b) y = 2x³ - 17x² + 38x – 15

 c) y = 6x³ + 11x² - 3x – 2 d) y = 4x³ - 12x² - 7x + 30

6. f(x) = 3x³ - 12x² + 6x – 24

 a) Use the factor theorem to show that (x – 4) is a factor of f(x)

 b) Hence show that 4 is the only real root of the equation f(x) = 0

7. f(x) = 4x³ + 4x² - 11x – 6

 a) Use the factor theorem to show that (x + 2) is a factor of f(x)

 b) Factorise f(x) completely

 c) Write down the solutions of the equation 4x³ + 4x² - 11x – 6 = 0

8. a) Show that (x – 2) is a factor of 9x4 - 18x³ - x² + 2x

 b) Hence find four real solutions to the equation 9x4 - 18x³ - x² + 2x = 0

**Factor Theorem and Algebraic Division AMBER**

1. a) Divide x³ + 6x² + 8x + 3 by (x + 1) b) Divide x³ - 5x² - 6x – 56 by (x – 7)

 x²

 x + 1 | x³ + 6x² + 8x + 3

 c) Divide 4x³ + 9x²- 3x – 10 by (x + 2) d) Divide -5x³ - 27x² + 23x + 30 by (x + 6)

2. a) Divide 3x4 + 8x³ - 11x² + 2x + 8 by (3x + 2)

 b) Divide 21x5 + 29x4 – 10x³ + 42x – 12 by (7x – 2)

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3. a) Find the remainder when x³ + 4x² - 3x + 2 is divided by (x + 5)

 b) Find the remainder when -2x³ + 3x² + 12x + 20 is divided by (x - 4)

4. a) Show that (x – 1) is a factor of x³ + 6x² + 5x – 12 and hence factorise the expression completely

Then divide by (x – 1)

 f(1) = (1)³ + 6(1)² + 5(1) – 12 =

Factorise your answer (should be a quadratic!)

 x²

 x - 1 | x³ + 6x² + 5x - 12

 b) Show that (x – 5) is a factor of x³ - 7x² + 2x + 40 and hence factorise the expression completely

5. Fully factorise the right hand side of each equation and hence sketch the graphs, showing all intercepts with axes

Fully factorise and solve each equation. Remember the solutions represent the x-intercepts and the coefficient of x° is the y-intercept.

 a) y = 2x³ + 5x² - 4x – 3 b) y = 2x³ - 17x² + 38x – 15

 c) y = 6x³ + 11x² - 3x – 2 d) y = 4x³ - 12x² - 7x + 30

The below are examples of exam questions. Make sure you read each question carefully and use the hints on the questions above to help you.

6. f(x) = 3x³ - 12x² + 6x – 24

 a) Use the factor theorem to show that (x – 4) is a factor of f(x)

 b) Hence show that 4 is the only real root of the equation f(x) = 0

7. f(x) = 4x³ + 4x² - 11x – 6

 a) Use the factor theorem to show that (x + 2) is a factor of f(x)

 b) Factorise f(x) completely

 c) Write down the solutions of the equation 4x³ + 4x² - 11x – 6 = 0

8. a) Show that (x – 2) is a factor of 9x4 - 18x³ - x² + 2x

 b) Hence find four real solutions to the equation 9x4 - 18x³ - x² + 2x = 0

**Factor Theorem and Algebraic Division RED**

1. a) Divide x³ + 6x² + 8x + 3 by (x + 1) b) Divide x³ - 5x² - 6x – 56 by (x – 7)

 x² + 5x

 x + 1 | x³ + 6x² + 8x + 3 x – 7 | x³ - 5x² - 6x – 56

 x³ + x²

 5x²

 c) Divide 4x³ + 9x²- 3x – 10 by (x + 2) d) Divide -5x³ - 27x² + 23x + 30 by (x + 6)

Fill the gaps with zeros to help you divide

2. a) Divide 3x4 + 8x³ - 11x² + 2x + 8 by (3x + 2)

 b) Divide 21x5 + 29x4 – 10x³ + **0x²** + 42x – 12 by (7x – 2)

 c) Divide 2x³ + 9x² + 25 by (x + 5)

3. a) Find the remainder when x³ + 4x² - 3x + 2 is divided by (x + 5)

 b) Find the remainder when -2x³ + 3x² + 12x + 20 is divided by (x - 4)

4. a) Show that (x – 1) is a factor of x³ + 6x² + 5x – 12 and hence factorise the expression completely

Then divide by (x – 1)

 f(1) = (1)³ + 6(1)² + 5(1) – 12 =

Factorise your answer (should be a quadratic!)

 x²

 x - 1 | x³ + 6x² + 5x - 12

 = (x – 1)( )

 = (x – 1)( )( )

 b) Show that (x – 5) is a factor of x³ - 7x² + 2x + 40 and hence factorise the expression completely

5. Fully factorise the right hand side of each equation and hence sketch the graphs, showing all intercepts with axes

Fully factorise and solve each equation. Remember the solutions represent the x-intercepts and the coefficient of x° is the y-intercept.

 a) y = 2x³ + 5x² - 4x – 3 b) y = 2x³ - 17x² + 38x – 15

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 b) Hence find four real solutions to the equation 9x4 - 18x³ - x² + 2x = 0