

**EXAM 1\_3 (POLYNOMIALS)**

Name: \_\_\_\_\_

Remember: in each question, write the steps you have taken to reach the solution.

1) Reduce the powers, using properties: (1.5 points)

a)  $\left(\frac{2}{3}\right)^{-2} \cdot \frac{2}{9} \cdot \left(\frac{3}{2}\right)^{-1} =$

b)  $\frac{a^{-2} \cdot (ab^2)^4 \cdot (a^2)^3}{a^5 \cdot b^{-2} \cdot (ab)^3} =$

2) Work out: (1.5 points)

a.  $2(x^3 - 2x^2 + x - 3) - (2x^3 + 4x - 6) =$

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

c.  $(x^2 + 3)(2x^3 + x - 2) =$

3) Complete: (1.5 points)

a.  $(1 + 2x)^2 = 1 + \dots +$

b.  $(\dots - \dots)^2 = x^2 - 10x + \dots$

d.  $(4a - \dots)(4a + \dots) = \dots - \frac{9}{4}$

4) Factorise the following: (1 point)

a.  $3x^3 - 12x^2 + 12x =$

b.  $9x^2 - 16 =$

5) Simplify: (2 points)

a.  $\frac{3x^3 - 3x}{6x^2 + 6x} =$

b.  $\frac{3x^3(x^2 + 10x + 25)}{6x(x^2 - 25)} =$

6) Work out and simplify: (2.5 points)

a.  $(x - 2)^2 - (x + 1)(x - 1) + 4x - 5 =$

b.  $(2x - 3)(2x + 3) - 4(x + 2)^2 =$

c.  $\frac{x+3}{3} - \frac{3x+1}{15} + \frac{1-x}{3} - \frac{1}{9} =$

**SOLUTION**

1) Reduce the powers, using properties:

$$a) \left(\frac{2}{3}\right)^{-2} \cdot \frac{2}{9} \cdot \left(\frac{3}{2}\right)^{-1} = \frac{3^2}{2^2} \cdot \frac{2}{3^2} \cdot \frac{2}{3} = \frac{3^2 \cdot 2^2}{2^2 \cdot 3^3} = \frac{1}{3}$$

$$b) \frac{a^{-2} \cdot (ab^2)^4 \cdot (a^2)^3}{a^5 \cdot b^{-2} \cdot (ab)^3} = \frac{a^{-2} \cdot a^4 \cdot b^8 \cdot a^6}{a^5 \cdot b^{-2} \cdot a^3 \cdot b^3} = \frac{a^8 \cdot b^8}{a^8 \cdot b} = b^7$$

2) Work out:

$$a. 2(x^3 - 2x^2 + x - 3) - (2x^3 + 4x - 6) = 2x^3 - 4x^2 + 2x - 6 - 2x^3 - 4x + 6 = -4x^2 - 2x$$

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

$$c. (x^2 + 3)(2x^3 + x - 2) = 2x^5 + x^3 - 2x^2 + 6x^3 + 3x - 6 = 2x^5 + 7x^3 - 2x^2 + 3x - 6$$

3) Complete:

$$a. (1 + 2x)^2 = 1 + 4x + 4x^2$$

$$b. (x - 5)^2 = x^2 - 10x + 25$$

$$d. \left(4a - \frac{3}{2}\right)\left(4a + \frac{3}{2}\right) = 16a^2 - \frac{9}{4}$$

4) Factorise the following:

$$a. 3x^3 - 12x^2 + 12x = 3x(x^2 - 4x + 4) = 3x(x - 2)^2$$

$$b. 9x^2 - 16 = (3x + 4)(3x - 4)$$

5) Simplify:

$$a. \frac{3x^3 - 3x}{6x^2 + 6x} = \frac{3x(x^2 - 1)}{6x(x + 1)} = \frac{3x(x + 1)(x - 1)}{2 \cdot 3x(x + 1)} = \frac{x - 1}{2}$$

$$b. \frac{3x^3(x^2 + 10x + 25)}{6x(x^2 - 25)} = \frac{3x \cdot x^2(x + 5)^2}{2 \cdot 3x(x + 5)(x - 5)} = \frac{x^2(x + 5)}{2(x - 5)}$$

6) Work out and simplify:

a.  $(x-2)^2 - (x+1)(x-1) + 4x - 5 = x^2 - 4x + 4 - (x^2 - 1) + 4x - 5 =$   
 $= x^2 - 4x + 4 - x^2 + 1 + 4x - 5 = 0$

b.  $(2x-3)(2x+3) - 4(x+2)^2 = 4x^2 - 9 - 4(x^2 + 4x + 4) =$   
 $= 4x^2 - 9 - 4x^2 - 16x - 16 = -16x - 25$

c.  $\frac{x+3}{3} - \frac{3x+1}{15} + \frac{1-x}{3} - \frac{1}{9} = \frac{15x+45}{45} - \frac{9x+3}{45} + \frac{15-15x}{45} - \frac{5}{45} =$   
 $= \frac{15x+45-9x-3+15-15x-5}{45} = \frac{-9x+52}{45}$