

Operations on Polynomials

Name: Key Date: _____

Part I: Classify the following polynomials by degree and number of terms. For the number of terms, use vocabulary such as monomial, binomial, trinomial or polynomial.

- | | | |
|-------------------------|--------------------------|--|
| 1) m^3 | 2) $2x - 2 + 4x^2$ | 1) Degree: <u>3 (cubic)</u>
Terms: <u>monomial</u> |
| | | 2) Degree: <u>2 (quadratic)</u>
Terms: <u>trinomial</u> |
| 3) $p^8 + p^7r^3$ | 4) $-4u + 2$ | 3) Degree: <u>8</u>
Terms: <u>binomial</u> |
| | | 4) Degree: <u>1 (linear)</u>
Terms: <u>binomial</u> |
| 5) 2 | 6) $-z + 0$ | 5) Degree: <u>0</u>
Terms: <u>monomial</u> |
| | | 6) Degree: <u>1 (linear)</u>
Terms: binomial <u>monomial</u> |
| 7) $-3h + g^2$ | 8) $x^3y + x^2 + 14xy^2$ | 7) Degree: <u>2 (quadratic)</u>
Terms: binomial <u>trinomial</u> |
| | | 8) Degree: <u>4 (quartic)</u>
Terms: <u>trinomial</u> |
| 9) $-f - 4 + f^3 + f^2$ | 10) $7 + j$ | 9) Degree: <u>3 (cubic)</u>
Terms: <u>polynomial</u> |
| | | 10) Degree: <u>1 (linear)</u>
Terms: <u>binomial</u> |

Part II: Add, subtract or multiply as appropriate. Write your answer in descending degree order.

11) $(a+7)+(a^3+4)$

12) $(b^3-2b)-(-b+3)$

11) a^3+a+11

$b^3-2b+b-3$

12) b^3-b-3

13) $(3c^5+2c^2-4)-(c^5-2c^2+4)$
 $-c^5+2c^2-4$

14) $(d^3+3d^2+3d+1)-(3d+3d^2)$
 $-3d-3d^2$

13) $2c^5+4c^2-8$

14) d^3+1

15) $(f+2)(f^2-f+1)$

16) $g^7(3g-4)$

15) f^3+f^2-f+2

f^3-f^2+f
 $+2f^2-2f+2$

16) $3g^8-4g^7$

17) $(1-h)(2+h)$

18) $(3j-7)(4j-2)$

17) $-h^2-h+2$

$2-h-h^2$

18) $12j^2-34j+14$

19) $(2k+3)(5k+1)$

20) $(7m-2)(3m+2)$

19) $10k^2+17k+3$

20) $21m^2+8m-4$

21) $(n-1)(n^4+n+1)$

22) $(p^2+2p+4)(p-2)$

21) $n^5-n^4+n^2-1$

n^5 $+n^2+n$
 $-n^4$ $-n-1$

p^3+2p^2+4p
 $-2p^2-4p-8$

22) p^3-8

Part III: Simplify the following expressions. Write your answer in descending degree order.

23) $(x+7)(3x-4) - (3x^2+2x)$

$3x^2 + 17x - 28 - 3x^2 - 2x$

24) $(y^3 - 4y + 1)(y + 2) - (-2y^2 + 3)$

$y^4 - 4y^2 + y$
 $2y^3 - 8y + 2$

$y^4 + 2y^3 - 4y^2 - 7y + 2 + 2y^2 - 3$

23) 15x - 28

24) $y^4 + 2y^3 - 2y^2 - 7y - 1$

25) $(2w+1)(3w+7) - (17w+7)$

$6w^2 + 17w + 7 - 17w - 7$

26) $(z^2+1)(z-4) + (z+1)(z+2)$

$z^3 - 4z^2 + z^2$
 $+ z - 4$

$z^3 - 4z^2 + z - 4 + z^2 + 3z + 2$

25) $6w^2$

26) $z^3 - 3z^2 + 4z - 2$

Part IV: Division of Polynomials

27) Divide $(4x^5 - 3x^3 + x)$ by (x)

27) $4x^4 - 3x^2 + 1$

28) Divide $(6a^4 - 3a^3 - 12a^2)$ by $(3a^2)$

28) $2a^2 - a - 4$

29) Divide $(z^2 + 2z - 24)$ by $(z - 4)$

$z-4 \overline{) z^2 + 2z - 24}$
 $-(z^2 + 4z)$
 $6z - 24$
 $-6z + 24$
 0

$4 \overline{) 1 \ 2 \ -24}$
 $\underline{4 \ 24}$
 $1 \ 6 \ 0$
 $(z+6)$

29) $(z+6)$

30) $(12y^2 + 36y + 15) \div (6y + 3)$

$6y+3 \overline{) 12y^2 + 36y + 15}$
 $\underline{-12y^2 + 6y}$
 $30y + 15$
 $\underline{-30y + 15}$
 0

$-\frac{1}{2} \overline{) 2 \ 6 \ 5\frac{1}{2}}$
 $\underline{-1 \ -5\frac{1}{2}}$
 $2 \ 5 \ 0$

30) $2y+5$

if you do: $-\frac{1}{2} \overline{) 12 \ 36 \ 15}$
 $\underline{-6 \ -15}$
 $12 \ 30 \ 0$
 $12y + 30 = 6(2y + 5)$

31) Divide $(9b^2 + 9b - 10)$ by $(3b - 2)$

$$\begin{array}{r} 3b+5 \\ 3b-2 \overline{) 9b^2+9b-10} \\ \underline{-9b+6b} \\ 15b-10 \\ \underline{-15b+10} \\ 0 \end{array}$$

$$\begin{array}{r} 2\frac{1}{3} \overline{) 3 \quad 3 \quad -10\frac{1}{3}} \\ \underline{3 \quad 5 \quad 0} \end{array}$$

31) $3b+5$

If you do:

$$\begin{array}{r} 2\frac{1}{3} \overline{) 9 \quad 9 \quad -10} \\ \underline{9 \quad 6 \quad 10} \\ 9b+15 = 3(3b+5) \end{array}$$

32) $(4x^2 + 6) \div (2x - 3)$

$$\begin{array}{r} 2x+3 + \frac{15}{2x-3} \\ 2x-3 \overline{) 4x^2+0x+6} \\ \underline{-4x+6x} \\ 6x+6 \\ \underline{-6x+9} \\ 15 \end{array}$$

$$\begin{array}{r} 1\frac{3}{2} \overline{) 2 \quad 0 \quad 3} \\ \underline{2 \quad 3 \quad 15\frac{1}{2}} \end{array}$$

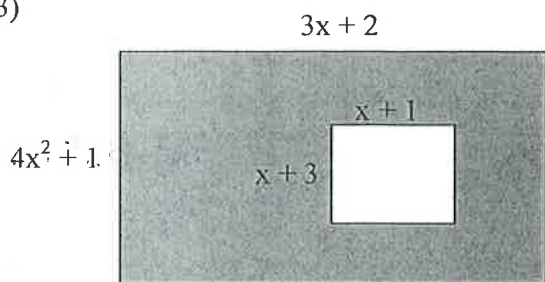
↑
you had ÷2
so this is really 15

If you do: 32) $2x+3 + \frac{15}{2x-3}$

$$\begin{array}{r} \frac{3}{2} \overline{) 4 \quad 0 \quad 6} \\ \underline{4 \quad 6 \quad 9} \\ 4x+6 + \frac{15}{2x-3} \\ 2(2x+3) + \frac{15}{2x-3} \end{array}$$

Part VI: In the following problems, compute the area of the shaded region.

33)



Whole area - unshaded

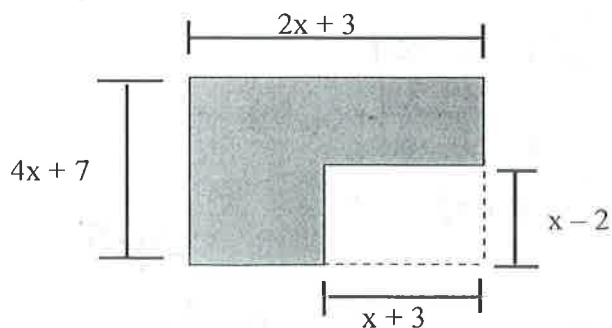
$$(4x^2+1)(3x+2) - (x+1)(x+3)$$

$$12x^3+8x^2+3x+2 - (x^2+4x+3)$$

$$= 12x^3+8x^2-4x-1$$

33) $12x^3+7x^2-x-1$

34)



Whole area - unshaded

$$(2x+3)(4x+7) - (x-2)(x+3)$$

$$8x^2+14x+21 - (x^2+x-6)$$

$$8x^2+26x+21 - x^2 - x + 6$$

34) $7x^2+25x+27$

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4) $-4u + 2$

3) Degree: _____

Terms: _____

4) Degree: _____

Terms: _____

5) 2

6) $-z + 0$

5) Degree: _____

Terms: _____

6) Degree: _____

Terms: _____

7) $-3h + g^2$

8) $x^3y + x^2 + 14xy^2$

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10) $7 + j$

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11) _____

12) _____

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14) $(d^3 + 3d^2 + 3d + 1) - (3d + 3d^2)$

13) _____

14) _____

15) $(f + 2)(f^2 - f + 1)$

16) $g^7(3g - 4)$

15) _____

16) _____

17) $(1 - h)(2 + h)$

18) $(3j - 7)(4j - 2)$

17) _____

18) _____

19) $(2k + 3)(5k + 1)$

20) $(7m - 2)(3m + 2)$

19) _____

20) _____

21) $(n - 1)(n^4 + n + 1)$

22) $(p^2 + 2p + 4)(p - 2)$

21) _____

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23) _____

24) _____

25) $(2w + 1)(3w + 7) - (17w + 7)$

26) $(z^2 + 1)(z - 4) + (z + 1)(z + 2)$

25) _____

26) _____

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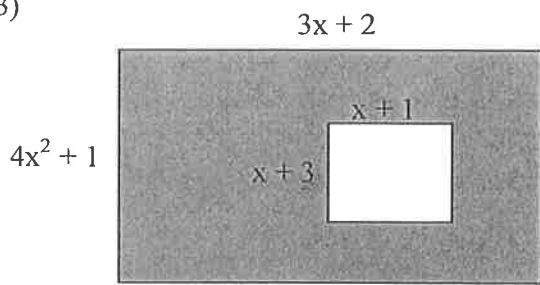
32) $(4x^2 + 6) \div (2x - 3)$

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