Division of Algebraic Expressions

Unit: Algebra - Student Practice Worksheet

Overview: Arjun divided $12x^3$ by $4x$ and got $3x^2$ in two seconds. Then Meera handed him $(x^2 + 5x + 6) \div (x + 2)$, and he froze. "You already know how to do this," she said. "You just factorised it yesterday." Arjun looked at the numerator, and the factorisation clicked into place.

Practice Questions (30 Total)

Section A - Easy

Q1. $12x^3$ divided by $4x$. Quotient?

$$12x^3 \quad \div \quad 4x$$

- ☐ **A.** $3x^2$
- ☐ **B.** $3x^3$
- ☐ **C.** $8x^2$
- ☐ **D.** $16x$■

Q2. What must you do to a polynomial before dividing it by another polynomial (not a monomial)?

- ☐ **A.** Multiply it by -1
- ☐ **B.** Add a constant
- ☐ **C.** Square it
- ☐ **D.** Factorise it completely

Q3. Divide $20x$■ by $5x^2$.

- ☐ **A.** $4x$■
- ☐ **B.** $4x^3$
- ☐ **C.** $15x^3$
- ☐ **D.** $4x^2$

Q4. Teal $6x^2$ plus maroon $9x$, each divided by $3x$. Result?

 ÷ 3x each term

- [ ] **A.** 2x + 9
- [ ] **B.** 2x² + 3x
- [ ] **C.** 2x + 3
- [ ] **D.** 3x + 3

Q5. How should you check a division answer?

- [ ] **A.** Add the divisor to the quotient
- [ ] **B.** Square the quotient
- [ ] **C.** Multiply the quotient by the divisor
- [ ] **D.** Nothing further is needed

Q6. Divide (x² + 5x + 6) by (x + 2).

- [ ] **A.** x + 2
- [ ] **B.** x + 3
- [ ] **C.** x + 6
- [ ] **D.** x² + 3

Q7. 8x■ divided by 2x². Quotient?

8x■ ÷ 2x²

- [ ] **A.** 4x²
- [ ] **B.** 4x■
- [ ] **C.** 6x²
- [ ] **D.** 10x²

Q8. What happens when a polynomial division does not cancel evenly?

- [ ] **A.** The division is impossible
- [ ] **B.** There is a remainder
- [ ] **C.** The answer is always zero
- [ ] **D.** You must add a variable

Q9. Factorise $x^2 + 5x + 6$.

- A. $(x + 2)(x + 3)$
- B. $(x + 1)(x + 6)$
- C. $(x + 5)(x + 6)$
- D. $(x + 2)(x + 6)$

Q10. When does a factor cancel, and why (x+2) does not cancel (x–2)?

- A. It must have the same number of terms
- B. It must be positive
- C. It must be a monomial
- D. It must match the divisor exactly

Section B - Medium

Q11. $24x^3y^2$ divided by $8xy$. Quotient?

$$24x^3y^2 \div 8xy$$

- A. $3x^2y$
- B. $3xy$
- C. $16x^2y$
- D. $3x^3y^2$

Q12. Divide $(x^2 – 9)$ by $(x + 3)$, using the difference-of-squares identity.

- A. $x + 9$
- B. $x + 3$
- C. $x – 3$
- D. $x – 9$

Q13. Divide $(10x^3 – 15x^2 + 5x)$ by $5x$.

- A. $2x^2 – 3x + 5$
- B. $2x^2 – 3x + 1$
- C. $5x^2 – 3x + 1$
- D. $2x^3 – 3x^2 + x$

Q14. $(x–3)^2$ divided by $(x–3)$. What remains?

$(x–3)^2 \div (x–3)$

- [ ] **A.** $x – 3$
- [ ] **B.** $x + 3$
- [ ] **C.** $x – 9$
- [ ] **D.** $x^2 – 3$

Q15. Divide $(4x^2 – 25)$ by $(2x – 5)$.

- [ ] **A.** $2x – 5$
- [ ] **B.** $4x + 5$
- [ ] **C.** $2x – 25$
- [ ] **D.** $2x + 5$

Q16. Divide $(2x^2 + 7x + 3)$ by $(2x + 1)$.

- [ ] **A.** $x + 1$
- [ ] **B.** $2x + 3$
- [ ] **C.** $x + 7$
- [ ] **D.** $x + 3$

Q17. $5x^2y^3 – 10xy^2$, each term ÷ $5xy$. Result?

$\div 5xy$

- [ ] **A.** $x^2y^3 – 2xy^2$
- [ ] **B.** $xy^2 – 2y$
- [ ] **C.** $xy^2 – 2y^2$
- [ ] **D.** $x^2y – 2y$

Q18. Divide $-18x$■ by $6x^3$.

- [ ] **A.** $-3x$■
- [ ] **B.** $3x^2$
- [ ] **C.** $-3x^2$

- [ ] **D.** $-12x^2$

Q19. Divide $(3x^2 + 11x + 6)$ by $(x + 3)$.

- [ ] **A.** $3x + 6$
- [ ] **B.** $3x + 2$
- [ ] **C.** $x + 2$
- [ ] **D.** $3x + 11$

Q20. Factor $x^2+2x-24$, then divide by $(x+6)$ and name the leftover factor.

- [ ] **A.** $x - 4$
- [ ] **B.** $x + 4$
- [ ] **C.** $x - 6$
- [ ] **D.** $x - 24$

Section C - Challenge

Q21. $(x+1)(x+2)(x+3)$ divided by $(x+1)$. What remains?

$$(x+1)(x+2)(x+3)$$
$$\div (x+1)$$

- [ ] **A.** $(x + 2)(x + 3)$
- [ ] **B.** $(x + 1)(x + 2)$
- [ ] **C.** $x + 5$
- [ ] **D.** $x^2 + 5x + 6$, incomplete

Q22. Divide $(x\blacksquare - 16)$ by $(x^2 + 4)$, using the difference-of-squares identity on the numerator.

- [ ] **A.** $x^2 + 4$
- [ ] **B.** $x^2 - 4$
- [ ] **C.** $x + 4$
- [ ] **D.** $x - 4$

Q23. Divide $(6x^2 - x - 15)$ by $(2x + 3)$.

- [ ] **A.** $3x + 5$
- [ ] **B.** $3x - 5$

- [ ] **C.** 2x – 5
- [ ] **D.** 6x – 5

Q24. Rectangle area $x^2-4x-21$, width $x+3$. Length?

area $x^2-4x-21$, width $x+3$

- [ ] **A.** (x + 7)
- [ ] **B.** (x – 21)
- [ ] **C.** (x – 7)
- [ ] **D.** (x – 4)

Q25. Divide $(x^2 – 2x + 1 – y^2)$ by $(x – 1 + y)$, given the numerator factors as $(x-1+y)(x-1-y)$.

- [ ] **A.** x + y – 1
- [ ] **B.** x – y – 1
- [ ] **C.** x – 1 + y
- [ ] **D.** x – 1 – y

Q26. Divide $(9x^2 – 4)$ by $(3x + 2)$.

- [ ] **A.** 3x + 2
- [ ] **B.** 9x – 2
- [ ] **C.** 3x – 4
- [ ] **D.** 3x – 2

Q27. $(2x+3)^2$ divided by $(2x+3)$. What remains?

$(2x+3)^2 \quad \div \quad (2x+3)$

- [ ] **A.** 2x + 3
- [ ] **B.** 2x – 3
- [ ] **C.** 4x + 3
- [ ] **D.** 2x + 9

Q28. Divide $(12x^2 + 7x - 12)$ by $(3x + 4)$.

- [ ] **A.** $4x + 3$
- [ ] **B.** $3x - 4$
- [ ] **C.** $4x - 3$
- [ ] **D.** $12x - 3$

Q29. Divide $(15x^3 - 20x^2)$ by $5x^2$, then substitute $x = 2$ into the result to find its value.

- [ ] **A.** $3x - 4$, giving 6
- [ ] **B.** $3x - 4$, giving 2
- [ ] **C.** $3x^2 - 4x$, giving 4
- [ ] **D.** $3x - 4x$, giving -2

Q30. Given $(x-2)(2x-1)(x+3) \div (x-2)$, write the remaining product.

- [ ] **A.** $(2x - 1)(x + 3)$
- [ ] **B.** $(x - 2)(2x - 1)$
- [ ] **C.** $2x - 1$
- [ ] **D.** $x + 3$

Answer Key

Q1: (A) (a) $3x^2$. Divide the coefficients ($12 \div 4 = 3$) and subtract the exponents ($x^3 \div x = x^2$).

Q2: (D) (d) Factorise it completely. Only once it's factored can you see which factor matches the divisor and cancels.

Q3: (B) (b) $4x^3$. $20 \div 5 = 4$, and $x\blacksquare \div x^2 = x^3$ — subtract the exponents, never add them.

Q4: (C) (c) $2x + 3$. Divide each term separately: $6x^2 \div 3x = 2x$, and $9x \div 3x = 3$.

Q5: (C) (c) Multiply the quotient by the divisor — it must reproduce the original. This is the one reliable check that catches an error anywhere in the process.

Q6: (B) (b) $x + 3$. Factorise the top to $(x+2)(x+3)$, then the $(x+2)$ cancels with the divisor, leaving $x+3$.

Q7: (A) (a) $4x^2$. $8 \div 2 = 4$, and $x\blacksquare \div x^2 = x^2$.

Q8: (B) (b) There is a remainder — the same idea as dividing 7 by 2 leaving a remainder of 1.

Q9: (A) (a) $(x + 2)(x + 3)$. 2 and 3 multiply to 6 and add to 5.

Q10: (D) (d) It must match the divisor exactly. A factor that merely looks similar, like $(x+2)$ versus $(x-2)$, does not cancel.

Q11: (A) (a) $3x^2y$. $24 \div 8 = 3$; $x^3 \div x = x^2$; $y^2 \div y = y$.

Q12: (C) (c) $x - 3$. $x^2 - 9$ factors as $(x+3)(x-3)$; the $(x+3)$ cancels with the divisor, leaving $x-3$.

Q13: (B) (b) $2x^2 - 3x + 1$. Divide each term by $5x$: $10x^3 \div 5x = 2x^2$, $-15x^2 \div 5x = -3x$, $5x \div 5x = 1$.

Q14: (A) (a) $x - 3$. $x^2 - 6x + 9 = (x-3)^2$; one factor of $(x-3)$ cancels with the divisor, leaving a single $(x-3)$.

Q15: (D) (d) $2x + 5$. $4x^2 - 25 = (2x+5)(2x-5)$, so dividing by $(2x-5)$ cancels that factor, leaving $(2x+5)$.

Q16: (D) (d) $x + 3$. $2x^2 + 7x + 3$ factors as $(2x+1)(x+3)$; the $(2x+1)$ cancels with the divisor.

Q17: (B) (b) $xy^2 - 2y$. Divide each term by $5xy$: $5x^2y^3 \div 5xy = xy^2$, and $-10xy^2 \div 5xy = -2y$.

Q18: (C) (c) $-3x^2$. $-18 \div 6 = -3$, and $x\blacksquare \div x^3 = x^2$ — the negative sign carries through the division unchanged.

Q19: (B) (b) $3x + 2$. $3x^2 + 11x + 6$ factors as $(3x+2)(x+3)$; the $(x+3)$ cancels with the divisor.

Q20: (A) (a) $x - 4$. $x^2 + 2x - 24$ factors as $(x+6)(x-4)$; the $(x+6)$ cancels with the divisor.

Q21: (A) (a) $(x + 2)(x + 3)$. The $(x+1)$ factor cancels with the divisor, leaving the product of the remaining two factors — which equals $x^2 + 5x + 6$ if expanded, but is best left factored.

Q22: (B) (b) $x^2 - 4$. $x\blacksquare - 16 = (x^2+4)(x^2-4)$; the (x^2+4) factor cancels with the divisor, leaving $x^2 - 4$.

Q23: (B) (b) $3x - 5$. $6x^2 - x - 15$ factors as $(2x+3)(3x-5)$ — check: first×last=-90, pair 9 and -10 multiply to -90 add to -1.

Q24: (C) (c) $(x - 7)$. $x^2 - 4x - 21$ factors as $(x+3)(x-7)$; dividing by the given width $(x+3)$ leaves the length $(x-7)$.

Q25: (D) (d) x – 1 – y. The (x–1+y) factor cancels with the divisor, leaving the other factor, x–1–y.

Q26: (D) (d) 3x – 2. $9x^2–4 = (3x+2)(3x–2)$, a difference of squares; the (3x+2) factor cancels with the divisor.

Q27: (A) (a) 2x + 3. $4x^2+12x+9 = (2x+3)^2$; one factor of (2x+3) cancels with the divisor, leaving a single (2x+3).

Q28: (C) (c) 4x – 3. $12x^2+7x–12$ factors as (3x+4)(4x–3) — first×last=-144, pair 16 and -9 multiply to -144 add to 7.

Q29: (B) (b) 3x – 4, giving 2. Dividing gives 3x–4; substituting x=2 gives 3(2)–4=6–4=2.

Q30: (A) (a) (2x – 1)(x + 3). The (x–2) factor cancels with the divisor, leaving the product of the other two factors.

You've got this! Keep learning and shining! - Ruchi Math Coaching