

School Name
Mathematics Test 2017

Year 10

Factorisation

Calculator Allowed

Skills and Knowledge Assessed:

- Factorise algebraic expressions by taking out a common algebraic factor (ACMNA230)
- Apply the four operations to simple algebraic fractions with numerical denominators (ACMNA232)
- Expand binomial products and factorise monic quadratic expressions using a variety of strategies (ACMNA233)
- Extension - Factorise non-monic quadratic expressions

Name _____

Section 1 Short Answer Section

Write all working and answers in the spaces provided on this test paper.

1. Factorise $5a + 15$.

.....

2. Factorise $14k + 21$.

.....

3. Factorise $8p^2 - 24p$.

.....

4. Factorise $8gt - 12t^2$.

.....

5. Factorise $-8mn - 28n^2$.

.....

6. Factorise $15w^2 + 25w^3$.

.....

7. Factorise $36x^2y^3 - 45x^2y^2z^2$.

.....

8.	Factorise $-48p^3r^2 - 32p^2r^3$
9.	Factorise $15c^2d^2 - 20cd^3 - 5c^3d^2$
10.	Factorise $q(p + 4) - r(p + 4)$
11.	Factorise $(x + 2)(y - 4) - 7(y - 4)$
12.	Factorise $2pc - 3p + 8c - 12$
13.	Factorise $m^2 + 7m + 10$
14.	Factorise $y^2 - y - 30$
15.	Factorise $k^2 - 14k + 48$
16.	Factorise $m^2 + 3m - 70$
17.	Factorise $4a^2 - 81$
18.	Factorise $m^2 - 16m + 64$
19.	Factorise $3s^2 - 23s + 14$

20. Factorise $5s^2 - 19s + 12$.

.....
.....

21. Factorise $8d^2 + 10d - 3$.

.....
.....
.....

22. Factorise $4a^3 - 6a^2b - 4ab^2$.

.....
.....
.....

School Name
Mathematics Test 2017

Year
10

Factorisation

Calculator Allowed

Name _____

Section 2 Multiple Choice Section

Mark all your answers on the accompanying multiple choice answer sheet, not on this test paper. You may do any working out on this test paper. Calculators are allowed for this section.

1. Factorise $4g - 24$.

- A. $4(g - 6)$ B. $4(g + 6)$ C. $4g(g - 6)$ D. $2(2g - 6)$

2. Factorise $x^2 - xy$.

- A. $x(x - xy)$ B. $x(x - y)$ C. $x(x + xy)$ D. $x(x + y)$

3. Factorise $4r^2 - 6r$.

- A. $2r(2r - 3)$ B. $2r^2(2r - 3)$ C. $4r(r - 3)$ D. $4r^2(r - 3)$

4. Factorise $8az - 12z$.

- A. $4a(2z - 3)$ B. $2z(4a - 6z)$ C. $4z(a - 3)$ D. $4z(2a - 3)$

5. Factorise $35s^2t + 45st^3$.

- A. $st(35 + 45t^2)$ B. $5s(7st + 9t^2)$
C. $5st(7s + 9t^2)$ D. $5st(7s + 9t)$

6.	Factorise $3w(r+5) - 8(r+5)$.	A. $(r-5)(3w+8)$	B. $(r+8)(3w-5)$
		C. $(r+5)(3w-8)$	D. $(3r+5)(w-8)$
7.	Factorise $2wy + 8w - y^2 - 4y$.	A. $(w-y)(2y+4)$	B. $(2w+y)(y-4)$
		C. $(w-2y)(y+4)$	D. $(2w-y)(y+4)$
8.	Factorise $10xz - 15x - 12z^2 + 18z$.	A. $(5x-6z)(2z-3)$	B. $(5x+6z)(2z-3)$
		C. $(5x-3z)(2z-6)$	D. $(6x-5z)(2z-3)$
9.	Factorise $s^2 + 11s + 28$.	A. $(s+2)(s+14)$	B. $(s+4)(s+7)$
		C. $(s+1)(s+28)$	D. $(s+4)(s+11)$
10.	Factorise $b^2 - 19b + 90$.	A. $(b-9)(b-10)$	B. $(b-6)(b+15)$
		C. $(b-5)(b+18)$	D. $(b-10)(b+9)$
11.	Factorise $p^2 + 7p - 18$.	A. $(p-9)(p+2)$	B. $(p-6)(p+3)$
		C. $(p-3)(p+6)$	D. $(p-2)(p+9)$
12.	Factorise $w^2 - 3w - 108$.	A. $(w-12)(w-9)$	B. $(w-18)(w+6)$
		C. $(w-12)(w+9)$	D. $(w-6)(w+18)$

13.	Factorise $9p^2 - r^2$.	A. $9p(p - r^2)$	B. $(3p - r)(3p + r)$
		C. $3p(p - r)(p + r)$	D. $(3p - r)^2$
14.	Factorise $2a^2 + 19a + 42$.	A. $(2a + 3)(a + 14)$	B. $(2a + 7)(a + 6)$
		C. $2(2a + 1)(a + 21)$	D. $2(a + 3)(a + 7)$
15.	Factorise $10d^2 - 43d + 28$.	A. $(5d - 4)(2d - 7)$	B. $(5d - 7)(2d - 4)$
		C. $(5d - 28)(2d - 1)$	D. $2(5d - 14)(d - 1)$
16.	Factorise $12z^2 + 15z - 18$.	A. $2(3z - 2)(2z + 3)$	B. $6(2z - 3)(z + 1)$
		C. $3(4z - 3)(z + 2)$	D. $3(2z - 3)(2z + 1)$

School Name
Mathematics Test 2017

Year 10

Factorisation

Calculator Allowed

Name _____

Section 3

Longer Answer Section

Write all working and answers in the spaces provided on this test paper.

Marks

1. Simplify the following algebraic fractions, by first factorising.

(a) $\frac{2pm + 4pn}{5m + 10n}$

2

.....

.....

.....

(b) $\frac{3x + 15}{4x} \times \frac{x}{2x^2 + 10x}$

2

.....

.....

.....

.....

Marks

2. Simplify the following algebraic fractions, by first factorising.

(a) $\frac{2x^2 + x - 15}{x^2 - 9}$

2

.....

.....

.....

(b) $\frac{x^2 + 2x - 24}{x^2 + 5x - 14} \times \frac{x^2 + 3x - 10}{x^2 + 11x + 30}$

3

.....

.....

.....

.....

.....

(c) $\frac{p^2 + 10p + 21}{2pq + 4q} \div \frac{p^2 - p - 12}{p^2 - 2p - 8}$

3

.....

.....

.....

.....

.....

School Name

Mathematics 2017

Multiple Choice Answer Sheet

Factorisation

Name _____

Completely fill the response oval representing the most correct answer.

- | | | | | | | | | |
|-----|---|-----------------------|---|-----------------------|---|-----------------------|---|-----------------------|
| 1. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 2. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 3. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 4. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 5. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 6. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 7. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 8. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 9. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 10. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 11. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 12. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 13. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 14. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 15. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 16. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |

School Name
Mathematics Test 2017

Year 10

Factorisation

Non Calculator Section

ANSWERS

Question	Working and Answer
1.	$5a + 15 = 5(a + 3)$
2.	$14k + 21 = 7(2k + 3)$
3.	$8p^2 - 24p = 8p(p - 3)$
4.	$8gt - 12t^2 = 4t(2g - 3t)$
5.	$-8mn - 28n^2 = -4n(2m + 7n)$
6.	$15w^2 + 25w^3 = 5w^2(3 + 5w)$
7.	$36x^2y^3 - 45x^2y^2z^2 = 9x^2y^2(4y - 5z^2)$
8.	$-48p^3r^2 - 32p^2r^3 = -16p^2r^2(3p + 2r)$
9.	$15c^2d^2 - 20cd^3 - 5c^3d^2 = 5cd^2(3c - 4d - c^2)$
10.	$q(p + 4) - r(p + 4) = (p + 4)(q - r)$
11.	$(x + 2)(y - 4) - 7(y - 4) = (y - 4)(x + 2 - 7)$ $= (y - 4)(x - 5)$

Question	Working and Answer
12.	$2pc - 3p + 8c - 12 = p(2c - 3) + 4(2c - 3)$ $= (p + 4)(2c - 3)$
13.	$m^2 + 7m + 10 = (m + 5)(m + 2)$
14.	$y^2 - y - 30 = (y - 6)(y + 5)$
15.	$k^2 - 14k + 48 = (k - 6)(k - 8)$
16.	$m^2 + 3m - 70 = (m - 7)(m + 10)$
17.	$4a^2 - 81 = (2a - 9)(2a + 9)$
18.	$m^2 - 16m + 64 = (m - 8)(m - 8) = (m - 8)^2$
19.	$3s^2 - 23s + 14 = 3s^2 - 21s - 2s + 14$ $= 3s(s - 7) - 2(s - 7)$ $= (3s - 2)(s - 7)$
20.	$5s^2 - 19s + 12 = 5s^2 - 15s - 4s + 12$ $= 5s(s - 3) - 4(s - 3)$ $= (5s - 4)(s - 3)$
21.	$8d^2 + 10d - 3 = 8d^2 - 2d + 12d - 3$ $= 2d(4d - 1) + 3(4d - 1)$ $= (2d + 3)(4d - 1)$
22.	$4a^3 - 6a^2b - 4ab^2 = 2a(2a^2 - 3ab - 2b^2)$ $= 2a(2a^2 + ab - 4ab - 2b^2)$ $= 2a(a(2a + b) - 2b(2a + b))$ $= 2a(a - 2b)(2a + b)$

School Name
Mathematics Test 2017

Year 10

Factorisation

Calculator Allowed
Multiple Choice
Section

ANSWERS

Question	Working	M C Answer
1.	$4g - 24 = 4(g - 6)$	A
2.	$x^2 - xy = x(x - y)$	B
3.	$4r^2 - 6r = 2r(2r - 3)$	A
4.	$8az - 12z = 4z(2a - 3)$	D
5.	$35s^2t + 45st^3 = 5st(7s + 9t^2)$	C
6.	$3w(r + 5) - 8(r + 5) = (r + 5)(3w - 8)$	C
7.	$2wy + 8w - y^2 - 4y = 2w(y + 4) - y(y + 4)$ $= (2w - y)(y + 4)$	D
8.	$10xz - 15x - 12z^2 + 18z = 5x(2z - 3) - 6z(2z - 3)$ $= (5x - 6z)(2z - 3)$	A
9.	$s^2 + 11s + 28 = (s + 4)(s + 7)$	B
10.	$b^2 - 19b + 90 = (b - 10)(b - 9)$	A

11.	$p^2 + 7p - 18 = (p - 2)(p + 9)$	D
12.	$w^2 - 3w - 108 = (w - 12)(w + 9)$	C
13.	$9p^2 - r^2 = (3p - r)(3p + r)$	B
14.	$\begin{aligned} 2a^2 + 19a + 42 &= 2a^2 + 12a + 7a + 42 \\ &= 2a(a + 6) + 7(a + 6) \\ &= (2a + 7)(a + 6) \end{aligned}$	B
15.	$\begin{aligned} 10d^2 - 43d + 28 &= 10d^2 - 35d - 8d + 28 \\ &= 5d(2d - 7) - 4(2d - 7) \\ &= (5d - 4)(2d - 7) \end{aligned}$	A
16.	$\begin{aligned} 12z^2 + 15z - 18 &= 3(4z^2 + 5z - 6) \\ &= 3(4z^2 + 8z - 3z - 6) \\ &= 3(4z(z + 2) - 3(z + 2)) \\ &= 3(4z - 3)(z + 2) \end{aligned}$	C

School Name

Mathematics 2017

Multiple Choice Answer Sheet

Factorisation

Name _____

Completely fill the response oval representing the most correct answer.

- | | | | | | | | | |
|-----|---|----------------------------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|
| 1. | A | <input checked="" type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 2. | A | <input type="radio"/> | B | <input checked="" type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 3. | A | <input checked="" type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 4. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input checked="" type="radio"/> |
| 5. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input checked="" type="radio"/> | D | <input type="radio"/> |
| 6. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input checked="" type="radio"/> | D | <input type="radio"/> |
| 7. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input checked="" type="radio"/> |
| 8. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input checked="" type="radio"/> |
| 9. | A | <input type="radio"/> | B | <input checked="" type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 10. | A | <input checked="" type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 11. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input checked="" type="radio"/> |
| 12. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input checked="" type="radio"/> | D | <input type="radio"/> |
| 13. | A | <input type="radio"/> | B | <input checked="" type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 14. | A | <input type="radio"/> | B | <input checked="" type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 15. | A | <input checked="" type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 16. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input checked="" type="radio"/> | D | <input type="radio"/> |

School Name

Mathematics Test 2017

Year 10

Factorisation

Calculator Allowed
Longer Answer
Section

ANSWERS

Question	Working and Answer	Marks
1.	(a) $\frac{2pm + 4pn}{5m + 10n} = \frac{2p(m + 2n)}{5(m + 2n)}$ $= \frac{2p}{5}$	2 marks for correct answer 1 mark for answer with some correct factorisation or cancellation
	(b) $\frac{3x + 15}{4x} \times \frac{x}{2x^2 + 10x} = \frac{3\cancel{(x+5)}}{4x} \times \frac{x}{2x\cancel{(x+5)}}$ $= \frac{3x}{8x^2}$ $= \frac{3}{8x}$	2 marks for correct answer 1 mark for answer with some correct factorisation or cancellation
2.	(a) $\frac{2x^2 + x - 15}{x^2 - 9} = \frac{(2x - 5)\cancel{(x + 3)}}{(x + 3)\cancel{(x - 3)}}$ $= \frac{2x - 5}{x - 3}$	2 marks for correct answer 1 mark for answer with some correct factorisation or cancellation

Question	Working and Answer	Marks
	<p>(b)</p> $\frac{x^2 + 2x - 24}{x^2 + 5x - 14} \times \frac{x^2 + 3x - 10}{x^2 + 11x + 30} = \frac{(x-4)\cancel{(x+6)}}{(x-2)\cancel{(x+7)}} \times \frac{\cancel{(x-2)}\cancel{(x+5)}}{\cancel{(x+6)}\cancel{(x+5)}}$ $= \frac{x-4}{x+7}$	<p>3 marks for correct answer</p> <p>2 marks for otherwise correct answer with minor error</p> <p>1 mark for answer with some correct factorisation or cancellation</p>
	<p>(c)</p> $\frac{p^2 + 10p + 21}{2pq + 4q} \div \frac{p^2 - p - 12}{p^2 - 2p - 8} = \frac{p^2 + 10p + 21}{2pq + 4q} \times \frac{p^2 - 2p - 8}{p^2 - p - 12}$ $= \frac{(p+7)\cancel{(p+3)}}{2q\cancel{(p+2)}} \times \frac{\cancel{(p+2)}\cancel{(p-4)}}{\cancel{(p+3)}\cancel{(p-4)}}$ $= \frac{p+7}{2q}$	<p>3 marks for correct answer</p> <p>2 marks for otherwise correct answer with minor error</p> <p>1 mark for answer with some correct factorisation or cancellation</p>