High School Mathematics Test 2013

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)

Name_____

Section 1 Short Answer Section

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

1. Factorise $56x - 63$.

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2. Factorise $2p^2 - 12p$.

……

3. Factorise $6mr^2 - 15r$.

……

4. Factorise $8b^4c^2 - 12b^2c$.

……

5. Factorise $35a^2b - 40ab + 25a^3b^3$.

……

6. Factorise $m(n + 2) + 2n(n + 2)$.

……

7. Factorise $e^2 + ef + 12e + 12f$.

……

8. Factorise $a^2 + 9a + 20$.

……

9. Factorise $y^2 - y - 30$.

……

10. Factorise $p^2 - 11p + 18$.

……

11. Factorise $m^2 + 14m - 32$.

……

12. Factorise $r^2 - 17r + 60$.

……

13. Factorise $m^2 - 64$.

……

14. Factorise $3c^2 + 29c + 40$.

……

……

15. Factorise $4g^2 + 15g - 25$.

……

……

16. Factorise $6d^2 - 7d - 20$.

……

……

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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 $5p^2 - 10p$.

   A. $5p(p-2)$ B. $5p(5p-2)$ C. $5p(p-5)$ D. $5p(2p-5)$

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2. Factorise $3w^2r - 2wr^2$.

   A. $3wr(w-2r)$ B. $wr(3w-2r)$ C. $r(3w-2r)$ D. $w(3w-2r)$

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3. Factorise $m(c+d) - n(c+d)$.

   A. $(c+d)(m+n)$ B. $(c-d)(m+n)$

   C. $(c+d)(m-n)$ D. $(c-d)(m-n)$

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4. Factorise $g^2 + 13g + 36$.

   A. $(g+12)(g+3)$ B. $(g+12)(g+1)$

   C. $(g+9)(g+4)$ D. $(g+36)(g+1)$

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5. Factorise $b^2 - 6b - 7$.

   A. $(b-6)(b+1)$ B. $(b+7)(b-1)$

   C. $(b+6)(b-1)$ D. $(b-7)(b+1)$

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6. Factorise $w^2 - 17w + 60$.

   A. $(w-5)(w-12)$ B. $(w-6)(w-10)$

   C. $(w-4)(w-15)$ D. $(w-3)(w-20)$

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7. Factorise $k^2 - 2k - 120$.

A. $(k + 5)(k - 24)$ B. $(k + 6)(k - 20)$

C. $(k + 8)(k - 15)$ D. $(k + 10)(k - 12)$

8. Factorise $9w^2 - 25$.

A. $9w(w - 5)$ B. $(3w - 5)(3w + 5)$

C. $(3w - 5)^2$ D. $(3w + 5)^2$

9. Factorise $16m^2 - 40mn + 25n^2$.

A. $(4m + 5n)(4m - 5n)$ B. $(4m + 5n)^2$

C. $(4m - 5n)^2$ D. $(4m + 5)\left(4m - 5n^2\right)$

10. Factorise $6c^2 - 37c + 45$.

A. $(3c - 5)(2c - 9)$ B. $(3c - 15)(2c - 3)$

C. $(6c - 5)(c - 9)$ D. $(6c - 15)(c - 3)$

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Section 3 Longer Answer Section

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

Marks

1. Factorise the following completely:

a) $4g^2 - 8g - 192$. **2**

……

……

b) $15e^3 + 40e^2 - 80e$. **2**

……

……

2. Simplify the algebraic fractions by first factorising.

a) $\dfrac{a^2 + 6a + 5}{a^2 + 11a + 30}$ **3**

……

……

……

Marks

b) $\dfrac{c^2 - 5c - 66}{c^2 + 16c + 60} \times \dfrac{c + 10}{c^2 - 11c}$. **3**

……

……

……

c) $\dfrac{1}{d^2 + 5d + 4} + \dfrac{3}{d^2 + 4d}$. **3**

……

……

……

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Multiple Choice Answer Sheet

Name _____

Completely fill the response oval representing the most correct answer.

1.	A ⬭	B ⬭	C ⬭	D ⬭
2.	A ⬭	B ⬭	C ⬭	D ⬭
3.	A ⬭	B ⬭	C ⬭	D ⬭
4.	A ⬭	B ⬭	C ⬭	D ⬭
5.	A ⬭	B ⬭	C ⬭	D ⬭
6.	A ⬭	B ⬭	C ⬭	D ⬭
7.	A ⬭	B ⬭	C ⬭	D ⬭
8.	A ⬭	B ⬭	C ⬭	D ⬭
9.	A ⬭	B ⬭	C ⬭	D ⬭
10.	A ⬭	B ⬭	C ⬭	D ⬭

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ANSWERS

Section 1	
1.	$56x - 63 = 7(8x + 9)$
2.	$2p^2 - 12p = 2p(p - 6)$
3.	$6mr^2 - 15r = 3r(2mr - 5)$
4.	$8b^4c^2 - 12b^2c = 4b^2c\left(2b^2c - 3\right)$
5.	$35a^2b - 40ab + 25a^3b = 5ab\left(7a - 8 + 5a^2b^2\right)$
6.	$m(n + 2) + 2n(n + 2) = (n + 2)(m + 2n)$
7.	$e^2 + ef + 12e + 12f = e(e + f) + 12(e + f)$ $= (e + f)(e + 12)$
8.	$a^2 + 9a + 20 = (a + 5)(a + 4)$
9.	$y^2 - y - 30 = (y - 6)(y + 5)$
10.	$p^2 - 11p + 18 = (p - 9)(p - 2)$
11.	$m^2 + 14m - 32 = (m + 16)(m - 2)$
12.	$r^2 - 17r + 60 = (r - 12)(r - 5)$
13.	$m^2 - 64 = (m - 8)(m + 8)$
14.	$3c^2 + 29c + 40 = 3c^2 + 24c + 5c + 40$ $= 3c(c + 8) + 5(c + 8)$ $= (3c + 5)(c + 8)$
15.	$4g^2 + 15g - 25 = 4g^2 + 20g - 5g - 25$ $= 4g(g + 5) - 5(g + 5)$ $= (4g - 5)(g + 5)$
16.	$6d^2 - 7d - 20 = 6d^2 + 8d - 15d - 20$ $= 2d(3d + 4) - 5(3d + 4)$ $= (3d + 4)(2d - 5)$

Section 2	
1.	A
2.	B
3.	C
4.	C
5.	D
6.	A
7.	D
8.	B
9.	C
10.	A

Section 3		
1.	a) $4g^2 - 8g - 192 = 4(g^2 - 2g - 48)$ $= 4(g + 6)(g - 8)$	1 for common factor 1 for binomial factor
	b) $15e^3 + 40e^2 - 80e = 5e(3e^2 + 8e - 16)$ $= 5e\,(3e - 4)(e + 4)$	1 for common factor 1 for binomial factor
2.	a) $\frac{a^2 + 6a + 5}{a^2 + 11a + 30} = \frac{(a + 5)(a + 1)}{(a + 6)(a + 5)}$ $= \frac{a + 1}{a + 6}$	2 for factorisations 1 for simplifying
	b) $\frac{c^2 - 5c - 66}{c^2 + 16c + 60} \times \frac{c + 10}{c^2 - 11c} = \frac{(c - 11)(c + 6)}{(c + 6)(c + 10)} \times \frac{c + 10}{c(c - 11)}$ $= \frac{1}{c}$	2 for factorisations 1 for simplifying
	c) $\frac{1}{d^2 + 5d + 4} + \frac{3}{d^2 + 4d} = \frac{1}{(+ 3d + 4)(d + 1)} + \frac{3}{d(d + 4)}$ $= \frac{d + 3(d + 1)}{d(d + 1)(d + 4)}$ $= \frac{4d + 3}{d(d + 1)(d + 4)}$	2 for factorisations 1 for addition

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Multiple Choice Answer Sheet

Name Marking Sheet

Completely fill the response oval representing the most correct answer.

1.	A ●	B ○	C ○	D ○
2.	A ○	B ●	C ○	D ○
3.	A ○	B ○	C ●	D ○
4.	A ○	B ○	C ●	D ○
5.	A ○	B ○	C ○	D ●
6.	A ●	B ○	C ○	D ○
7.	A ○	B ○	C ○	D ●
8.	A ○	B ●	C ○	D ○
9.	A ○	B ○	C ●	D ○
10.	A ●	B ○	C ○	D ○