Identities

Exam Style Questions

1. For each of the following, tick the boxes to say whether it is an equation, expression, identity or formula.

	Equation	Expression	Identity	Formula
$3x - 2 = 8x + 6$	✓			
$5x + y$		✓		
$2x + 3x \equiv 5x$			✓	
$A = \pi r^2$				✓
$3x(x + 2) \equiv bx^2 + 6x$			✓	
$(x + 1)(x + 2) = 0$	✓			

(2 marks)

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2. For the following, identify whether it is an equation ($=$) or identity ($\equiv$) by using the correct symbols.

$2x + 7$	$=$	2
$8x - 2x$	$\equiv$	$6x$
$2x^2 + 3x$	$\equiv$	$3x + 2x^2$
$11x - 2$	$=$	$-x + 7$
$x(x + 2)$	$\equiv$	$x^2 + 2x$

(2 marks)

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3. $x(3x + a) \equiv 3x^2 + 7x$

Find the value of a.

$3x^2 + ax \equiv 3x^2 + 7x$

$a =$ 7

(1 mark)

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4. $a(2x + 3) \equiv 14x + b$

Find the values of a and b.

$2ax + 3a \equiv 14x + b$

$2a = 14 \Rightarrow a = 7$

$3a = b$

$3(7) = b \Rightarrow b = 21$

$a =$ 7

$b =$ 21

(2 marks)

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5. $6(x + a) + b(x + 7) \equiv 9x + 33$

Find the values of a and b.

$6x + 6a + bx + 7b \equiv 9x + 33$

$6 + b = 9 \Rightarrow b = 3$

$6a + 7b = 33$

$6a + 7(3) = 33$

$6a + 21 = 33$

$6a = 12$

$a = 2$

$a =$ 2

$b =$ 3

(2 marks)

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6. $(a + 1)x^2 + 3b \equiv 2x^2 + 6$

Find the values of a and b.

$a + 1 = 2 \Rightarrow a = 1$

$3b = 6 \Rightarrow b = 2$

$a =$ 1

$b =$ 2

(2 marks)

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7. $a(x + 4) + 5(2x + b) \equiv 17x + 33$

Find the values of a and b.

$ax + 4a + 10x + 5b \equiv 17x + 33$

$a + 10 = 17 \Rightarrow a = 7$

$4a + 5b = 33$

$4(7) + 5b = 33$

$5b = 5 \Rightarrow b = 1$

$a =$ 7

$b =$ 1

(2 marks)

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8. $-3(x + 1) + a(x - b) \equiv -x - 11$

Find the values of a and b.

$-3x - 3 + ax - ab \equiv -x - 11$

$-3 + a = -1 \Rightarrow a = 2$

$-3 - ab = -11$

$-3 - 2b = -11$

$-2b = -8$

$b = 4$

$a =$ 2

$b =$ 4

(2 marks)

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9. $3ax + 7 + 2(x + b) \equiv 17x + 15$

Find the values of a and b.

$3ax + 7 + 2x + 2b \equiv 17x + 15$

$3a + 2 = 17$

$3a = 15 \Rightarrow a = 5$

$7 + 2b = 15$

$2b = 8$

$b = 4$

$a =$ 5

$b =$ 4

(2 marks)

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10. $(x + 4)(x + 2) + ax + b \equiv x^2 + 13x + 10$

Find the values of a and b.

$x^2 + 2x + 4x + 8 + ax + b \equiv x^2 + 13x + 10$

$2 + 4 + a = 13$

$6 + a = 13 \Rightarrow a = 7$

$8 + b = 10 \Rightarrow b = 2$

$a =$ 7

$b =$ 2

(2 marks)

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11. $2(3x - 1)(x + 3) + ax^2 - b \equiv 7x^2 + 16x - 7$

Find the values of a and b.

$2(3x^2 + 9x - x - 3) + ax^2 - b \equiv 7x^2 + 16x - 7$

$6x^2 + 18x - 2x - 6 + ax^2 - b \equiv 7x^2 + 16x - 7$

$6 + a = 7 \Rightarrow a = 1$

$-6 - b = -7 \Rightarrow b = 1$

$a =$ 1

$b =$ 1

(2 marks)

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12. $(x - 1)^2 + a(x - 1) - x + b \equiv x^2$

Find the values of a and b.

$(x-1)(x-1) + ax - a - x + b \equiv x^2$

$x^2 - 2x + 1 + ax - a - x + b \equiv x^2$

$-2 + a - 1 = 0$

$a - 3 = 0 \Rightarrow a = 3$

$1 - a + b = 0$

$1 - 3 + b = 0$

$-2 + b = 0$

$b = 2$

$a =$ 3

$b =$ 2

(2 marks)

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13. $(x + a)(x + 2a) \equiv x^2 + 3bx + 2$

Given that a is a negative integer, find the values of a and b.

$x^2 + 2ax + ax + 2a^2 \equiv x^2 + 3bx + 2$

$x^2 + 3ax + 2a^2 \equiv x^2 + 3bx + 2$

$2a^2 = 2$

$a^2 = 1 \Rightarrow a = \pm 1$

a is negative $\Rightarrow a = -1$

$3a = 3b$

$-3 = 3b \Rightarrow b = -1$

$a =$ -1

$b =$ -1

(2 marks)

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14. $(x + b)^2 \equiv x^2 + ax + 49$

Given that b is a positive integer, find the values of a and b.

$x^2 + 2bx + b^2 \equiv x^2 + ax + 49$

$b^2 = 49 \Rightarrow b = \pm 7$

b is positive

So $b = 7$

$2b = a \Rightarrow a = 2(7)$

$= 14$

$a =$ 14

$b =$ 7

(2 marks)

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15. $6x^3 + 9x^2 \equiv (a + b)x^3 + abx^2$

Find the values of a and b.

$a+b=6$

$ab=9 \Rightarrow a=\frac{9}{b}$

$\frac{9}{b}+b=6$

$9+b^2=6b$

$b^2-6b+9=0$

$(b-3)^2=0$

$b=3$

$a+3=6 \Rightarrow a=3$

$a =$ 3

$b =$ 3

(3 marks)

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16. $7x + 2 \equiv (2a + b)x + (a + b)$

Find the values of a and b.

$2a+b=7$

$a+b=2$

$a=5$

$b=-3$

$a =$ 5

$b =$ -3

(3 marks)

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17. $ax^3 + (b + c)x^2 + (2b + 3c)x + d \equiv 3x^3 + 5x + 7$

Find the values of a, b, c and d.

$a = 3$

$b + c = 0$

$2b + 3c = 5$

$d = 7$

$2b + 3c = 5$

$2b + 2c = 0$

$c = 5$

$b = -5$

$a =$ 3

$b =$ -5

$c =$ 5

$d =$ 7

(3 marks)

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18. $\frac{ax^2+7x+b}{2x+3} \equiv x + 2$

Find the values of a and b.

$ax^2 + 7x + b \equiv (x + 2)(2x + 3)$

$ax^2 + 7x + b \equiv 2x^2 + 7x + 6$

$a = 2$

$b = 6$

$a =$ 2

$b =$ 6

(2 marks)

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19. $\frac{(x+1)(x+2)(x+a)(bx+1)}{(x+3)(2x+1)} \equiv (x+1)(x+2)$

Write down the values of a and b.

$a = 3 \quad b = 2$

$a =$ 3

$b =$ 2

(2 marks)