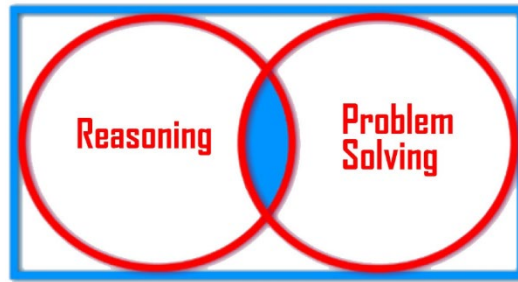


GCSE Foundation (5 – 1)



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Mathematical Reasoning Questions (Expanding and Factorising) – Set 1 Solutions

The questions are repeated here for your convenience

- 1** Choose the expression which is equivalent to $2(a + 3) + 5a$
- a) $7a + 3$
 - b) $6a + 5$
 - c) $11a$
 - d) $7a + 6$

Solution

Expand the brackets and simplify

$$2(a + 3) + 5a = 2a + 6 + 5a = 7a + 6$$

Correct Answer: D **[2marks]**

- 2** Choose the expression which is equal to $(a + b)(a - b)$ from the options below.
- a) a^2
 - b) $-b^2$
 - c) $a^2 - b^2$
 - d) $a^2 + b^2$

Solution

$$(a + b)(a - b) = a^2 + (-ab) + ba + (-b^2)$$

{Note that, $-ab + ab = 0$ since $ab = ba$ }

$$a^2 + (-ab) + ba + (-b^2) = a^2 - b^2$$

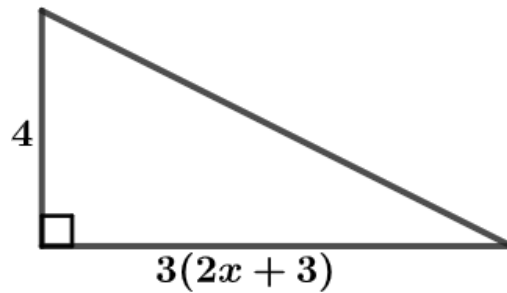
Correct Answer: C **[1mark]**

- 3** Match each expression in **Set A** to an equivalent expression in **Set B**

Set A	Set B
$18x^2 + 14x$	$-3(x - 5)$
$15 - 3x$	$4x(1 - 3x)$
$4x - 12x^2$	$2(9x^2 + 7x)$
$2(x + 3) + 6(x - 5)$	$x^2 + 4x + 3$
$(x + 1)(x + 3)$	$8x - 24$

[5Marks]

4 Write out an expression for the area of the triangle below



Solution

Area of a right-angled triangle = $\frac{1}{2}bh$

$$\frac{4 \times 3(2x + 3)}{2} = \frac{4(6x + 9)}{2} = 2(6x + 9) = 12x + 18$$

Therefore, the area of the triangle is $12x + 18$ **[3marks]**

5 Kelsey is expanding the brackets below

$$2(2x + 3) - 5(x + 2)$$

Here is her answer

Expand the brackets: $4x + 6 - 5x + 10$

Collect all the like terms together: $-x + 16$

Explain why Kelsey's answer is wrong and work out the correct answer.

Solution

Kelsey did not expand the second bracket correctly

She failed to recognise the number outside the bracket is -5

That is: $-5(x + 2) = -5x - 10$ **[1mark]**

$$\text{So, } 2(2x + 3) - 5(x + 2) = 4x + 6 - 5x - 10 = -x - 4$$

The correct answer is $(-x - 4)$ **[1mark]**

6	<p>Hamood is factorising the expression $16xy - 20y$ He writes: 4 is the highest common factor between 16 and 20 Therefore, when factorised, the expression will become</p> $4(4xy - 5y)$ <p>Explain why Hamood is wrong and factorise the expression fully</p> <p style="text-align: center;"><u>Solution</u></p> <p>Hamood is wrong because he did not account for the highest common factor between 'xy' and 'y'. So, the expression factorises fully to $4y(4x - 5)$ [2marks]</p>
7	<p>Complete the calculation below by filling in the missing numbers or expressions</p> $\square (2x + \square) + 5 = 12x^2 + 18x + \square$ <p style="text-align: center;"><u>Solution</u></p> <p>To obtain $12x^2$ we need to multiply $2x$ by $6x$ Therefore, the first box outside the brackets must contain $6x$ To obtain $18x$ we need to multiply $6x$ by 3 Therefore, the second box inside the brackets must contain 3 Hence, we need 5 in the box on the RHS Correct Answer:</p> $\boxed{6x} (2x + \boxed{3}) + 5 = 12x^2 + 18x + \boxed{5}$ <p style="text-align: right;">[3marks]</p>
8	<p>Answer True or False</p> <p>a) $\frac{2(a+b)}{2} = a + b$ True</p> <p>b) $6a^2b + 5 = a(6ab + 5)$ False</p> <p>c) $7 \times (2x + 3) = 14x + 21$ True</p>

9 Sharif is going to simplify the expression $3x + 5x(2x + 7)$

Here is his Answer

$$3x + 5x = 8x$$

So

$$8x(2x + 7)$$

$$= 16x + 56x$$

$$= 72x$$

Identify the two mistakes Sharif made and simplify the expression

Solution

1. He cannot add $3x$ and $5x$ immediately, He must expand the bracket by multiplying it by $5x$ first

2. $8x(2x + 7) = 16x^2 + 56x$, not $16x + 56x$

[1mark]

The correct Answer

$$3x + 5x(2x + 7)$$

$$3x + 10x^2 + 35x = 10x^2 + 38x$$

[2marks]

10 Here is a pattern



$$\text{Line 1: } (x - y)(x + y) = x^2 - y^2$$

$$\text{Line 2: } (2x - 2y)(2x + 2y) = 4x^2 - 4y^2$$

$$\text{Line 3: } (3x - 3y)(3x + 3y) = 9x^2 - 9y^2$$

$$\text{Line 4: } (4x - 4y)(4x + 4y) = 16x^2 - 16y^2$$

Use the pattern to find the answer to the expression

$$(ax - ay)(ax + ay)$$

Solution

Difference of two squares

$$(ax - ay)(ax + ay) = a^2x^2 - a^2y^2$$

Or Multiply out the double brackets

[2marks]