Varied Fluency
Step 3: Use An Algebraic Rule

National Curriculum Objectives:

Mathematics Year 6: (6A2) Use simple formulae

Differentiation:

Developing Questions to support using algebraic rules. Using up to 2 steps, addition and subtraction, and multiplication by 2.
Expected Questions to support using algebraic rules. Using up to 2 steps and all 4 operations.
Greater Depth Questions to support using algebraic rules. Using 2 steps and all 4 operations where some answers may include decimals and negative numbers.

More Year 6 Algebra resources.

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Use An Algebraic Rule

1a. Calculate the output for the following rules where a = 12.

(a + 10) x 2	
2a – 4	
(a – 3) x 2	

D VF

Use An Algebraic Rule

1b. Calculate the output for the following rules where a = 7.

(2a + a) – 2	
(56 + 10) – a	
35 + a	

D VF

2a. Match the output to the correct expression, where a = 10.

45 – 2a	62
(a + 5) x 2	25
72 – a	30

D VF

2b. Match the output to the correct expression, where a = 2.

9 + (a – 1)	10
100 – 2a	14
(a + 5) x 2	96

D VF

3a. True or false?

11 → 2a + (15 – a) → 26

D VF

3b. True or false?

15 → (50 – a) – 10 → 40

D VF

4a. Toby is using the expression 5 + 2a.

Calculate the value of a when his outputs are;

5 + 2a

	17
	27
	11

D VF

4b. Tim is using the expression (a – 2) x 2.

Calculate the value of a when his outputs are;

(a – 2) x 2

	16
	24
	10

D VF

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Use An Algebraic Rule

5a. Calculate the output for the following rules where a = 5.

2a + 5	
(a + 3) ÷ 4	
4a – 15	

E VF

Use An Algebraic Rule

5b. Calculate the output for the following rules where a = 9.

$a^2 - 7$	
(10a – 6) ÷ 2	
12 + 3a	

E VF

6a. Match the output to the correct expression, where a = 10.

3a – 5	3
(a – 4) ÷ 2	23
2a + 3	25

E VF

6b. Match the output to the correct expression, where a = 7.

25 + 5a	18
(a ÷ 7) + 8	9
(a – 4) x 6	60

E VF

7a. True or false?

12 → (a – 8) x 10 → 40

E VF

7b. True or false?

5 → $a^2 - 10$ → 0

E VF

8a. Ivy is using the expression (a – 1) ÷ 3.

Calculate the value of a when her outputs are;

(a – 1) ÷ 3

	3
	5
	10

E VF

8b. Jo is using the expression 8a – (a ÷ 2).

Calculate the value of a when her outputs are;

8a – (a ÷ 2)

	75
	90
	30

E VF

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Use An Algebraic Rule

9a. Calculate the output for the following rules where a = 12.

$\frac{1}{2}a + (25 - a)$	
$(a^2 - 10) \div 10$	
$3a - (2a + 20)$	

GD VF

10a. Match the output to the correct expression, where a = 2.5.

$3a - (5 + 2a)$	0
$\frac{1}{2}(4a \times 2)$	10
$10a - (5a \times 2)$	- 2.5

GD VF

11a. True or false?

$0.5 \rightarrow (10a \times 12) - 70 \rightarrow 0$

GD VF

12a. Will is using the expression $(a^2 + 10) \div 10$.

Calculate the value of a when his outputs are;

$(a^2 + 10) \div 10$

	1
	9.1
	4.6

GD VF

Use An Algebraic Rule

9b. Calculate the output for the following rules where a = 5.

$a^2 + (10a - 100)$	
$(5a - 6) \div 10$	
$9a - (10a + 7)$	

GD VF

10b. Match the output to the correct expression, where a = 12.

$5a \div (a - 2)$	6
$(2a \div 4) - 12$	63
$(2a + 7.5) \times 2$	- 6

GD VF

11b. True or false?

$2 \rightarrow (a^3 - 5) - 12 \rightarrow - 10$

GD VF

12b. Harry is using the expression $(\frac{1}{2}a + a) \times 2$.

Calculate the value of a when his outputs are;

$(\frac{1}{2}a + a) \times 2$

	27
	60
	9

GD VF

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Varied Fluency
Use An Algebraic Rule

Developing

1a. 44, 20, 18

2a. 45 – 2a = 25; (a + 5) x 2 = 30; 72 – a = 62

3a. True

4a. 6, 11, 3

Expected

5a. 15, 2, 5

6a. 3a – 5 = 25; (a – 4) ÷ 2 = 3; 2a + 3 = 23

7a. True

8a. 10, 16, 31

Greater Depth

9a. 19, 13.4, -8

10a. 3a – (5 + 2a) = - 2.5; $\frac{1}{2}$(4a x 2) = 10; 10a – (5a x 2) = 0

11a. False, the correct answer is -10.

12a. 0, 9, 6

Varied Fluency
Use An Algebraic Rule

Developing

1b. 19, 59, 42

2b. 9 + (a – 1) = 10; 100 – 2a = 96; (a + 5) x 2 = 14

3b. False, the correct answer is 25.

4b. 10, 14, 7

Expected

5b. 74, 42, 39

6b. 25 + 5a = 60; (a ÷ 7) + 8 = 9; (a – 4) x 6 = 18.

7b. False, the correct answer is 15.

8b. 10, 12, 4

Greater Depth

9b. -25, 1.9, -12

10b. 5a ÷ (a – 2) = 6; (2a ÷ 4) – 12 = - 6; (2a + 7.5) x 2 = 63

11b. False, the correct answer is -9.

12b. 9, 20, 3

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Reasoning and Problem Solving
Step 3: Use An Algebraic Rule

National Curriculum Objectives:

Mathematics Year 6: (6A2) Use simple formulae

Differentiation:

Questions 1, 4 and 7 (Reasoning)
Developing Explain whether a statement is correct. Using addition, subtraction and multiplication by 2.
Expected Explain whether a statement is correct. Using all 4 operations.
Greater Depth Explain whether a statement is correct. Using all 4 operations where some answers may be decimals or negative numbers.

Questions 2, 5 and 8 (Problem Solving)
Developing Use the cards to create three different algebraic expressions, where one function is given. Using addition, subtraction and multiplication by 2.
Expected Use the cards to create four different algebraic expressions. Using all 4 operations.
Greater Depth Use the cards to create four different algebraic expressions . Using all 4 operations where some numbers may be decimals or negative numbers.

Questions 3, 6 and 9 (Reasoning)
Developing Explain whether a statement is true or false. Using addition, subtraction and multiplication by 2.
Expected Explain whether a statement is true or false. Using all 4 operations.
Greater Depth Explain whether a statement is true or false. Using all 4 operations where some answers may be decimals or negative numbers.

More Year 6 Algebra resources.

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Use An Algebraic Rule

1a. Millie is using the rule 2a + 3.

Harry is using the rule (a + 3) x 2.

Harry says:



Both rules will give the same answer.

Do you agree? Explain your answer.

D R

Use An Algebraic Rule

1b. Amina is using the rule a – (a – 2).

Tom is using the rule (2a + 5) – 23.

Amina says:



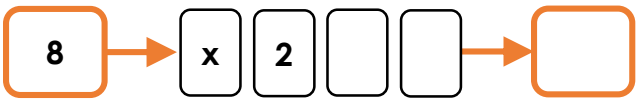
Both rules will give an answer of two when a = 10.

Do you agree? Explain your answer.

D R

2a. Use the cards below to create 3 different algebraic expressions for this function machine.

10	–	2	+	3



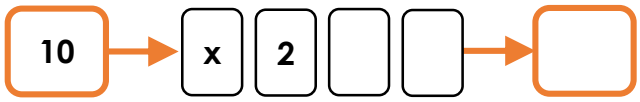
Work out the outputs for each expression.

What is the greatest output you can make?

D PS

2b. Use the cards below to create 3 different algebraic expressions for this function machine.

18	–	25	+	9



Work out the outputs for each expression.

What is the greatest output you can make?

D PS

3a. True or false?

A two step function machine which has +10, – 9 as its functions could provide the same output using one step of + 1.



Explain your answer.

D R

3b. True or false?

A two step function machine which has +20, – 18 as its functions could provide the same output using just one step of – 2.



Explain your answer.

D R

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Use An Algebraic Rule

4a. Hafsa is using the rule 3a + 5.

Jake is using the rule (a + 5) x 3.

Jake says:



Both rules will give the same answer.

Do you agree? Explain your answer.

E R

Use An Algebraic Rule

4b. Iqra is using the rule $a^2 - (a \times a)$.

Jake is using the rule (3a + 5a) x 0.

Iqra says:



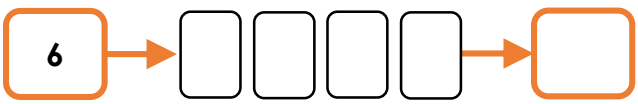
Both rules will give an answer of zero.

Do you agree? Explain your answer.

E R

5a. Use the cards below to create 4 different algebraic expressions for this function machine.

4	x	÷	2	+	7



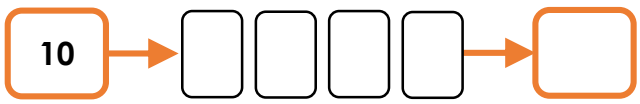
Work out the outputs for each expression.

What is the greatest output you can make?

E PS

5b. Use the cards below to create 4 different algebraic expressions for this function machine.

1	x	–	9	+	10



Work out the outputs for each expression.

What is the greatest output you can make?

E PS

6a. True or false?

A two step function machine which has +4, – 9 as its functions could provide the same output using just one step.



Explain your answer.

E R

6b. True or false?

A two step function machine which has +10, – 5 as its functions could provide the same output using just one step.



Explain your answer.

E R

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Use An Algebraic Rule

7a. Jess is using the rule (5a ÷ 2) – 3a.

Toby is using the rule (3a ÷ 2) – 5a.

Toby says:



Both rules will always give a negative answer.

Do you agree? Explain your answer.

GD

R

Use An Algebraic Rule

7b. Maia is using the rule 10 (6a ÷ 2).

Isaac is using the rule (10 x 6a) ÷ 2.

Maia says:



Both rules will always give the same answer.

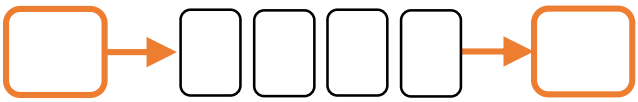
Do you agree? Explain your answer.

GD

R

8a. Use the cards below to create 4 different algebraic expressions for this function machine.

50	2.5	x	÷	5	+	10



Work out the outputs for each expression.

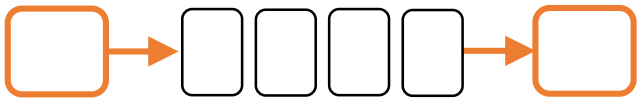
What is the greatest output you can make?

GD

PS

8b. Use the cards below to create 4 different algebraic expressions for this function machine.

8	0.5	x	÷	25	–	100



Work out the outputs for each expression.

What is the greatest output you can make?

GD

PS

9a. True or false?

$a^3 – (10a + a)$ is the same as $a^3 – 11a$.



Explain your answer.

GD

R

9b. True or false?

$(\frac{1}{2} a \div 100) – 35$ will always result in a negative answer.



Explain your answer.

GD

R

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Reasoning and Problem Solving
Use An Algebraic Rule

Developing

1a. No. Children can show this to be untrue using any number for both rules.

2a. Various possible answers, for example:

x 2 + 10 = 26

x 2 + 3 = 19

x 2 – 10 = 6

Greatest output = 26

x 2 + 10

3a. True. + 10, - 9 is the same as + 1. Children can show different examples of inputs to prove their statement.

Expected

4a. No. Children can show this to be untrue using any number for both rules.

5a. Various possible answers, for example:

x 7 ÷ 2 = 21

÷ 2 + 4 = 7

÷ 2 x 7 = 21

+ 2 x 7 = 56

Greatest output = 70

+ 4 x 7

6a. True. + 4, - 9 is the same as +5. Children can show different examples of inputs to prove their statement.

Greater Depth

7a. Yes. Children can show this to be true using any number for both rules.

8a. Various possible answers, for example:

50 ÷ 10 x 5 = 25

50 x 10 + 5 = 505

50 + 10 - 2.5 = 57.5

10 x 50 + 5 = 505

Greatest output = 505

9a. True. Children to show that both expressions result in the same answer.

Reasoning and Problem Solving
Use An Algebraic Rule

Developing

1b. Yes. Children can show this to be true by substituting a for 10.

2b. Various possible answers, for example:

x 2 + 25 = 45

x 2 + 18 = 38

x 2 – 9 = 11

Greatest output = 45

x 2 + 25

3b. False. + 20, - 18 is the same as +2, not – 2. Children can show different examples of inputs to prove their statement.

Expected

4b. Yes. Children can show this to be true using any number for both rules.

5b. Various possible answers, for example:

x 10 + 9 = 109

- 10 + 1 = 1

+ 10 x 1 = 20

+ 1 x 9 = 99

Greatest output = 190

+ 9 x 10

6b. True. + 10, - 5 is the same as + 5. Children can show different examples of inputs to prove their statement.

Greater Depth

7b. Yes. Children can show this to be true using any number for both rules.

8b. Various possible answers, for example:

8 ÷ 8 x 100 = 100

0.5 x 100 - 25 = 25

25 x 100 - 2.5 = 2,497.5

8 x 100 - 25 = 775

Greatest output = 2,497.5

9b. False. Children to show a variety of examples to prove their statement.

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