

Reasoning and Problem Solving

Step 10: Enumerate Possibilities

National Curriculum Objectives:

Mathematics Year 6: (6A5) [Enumerate possibilities of combinations of two variables](#)

Differentiation:

Questions 1, 4 and 7 (Reasoning)

Developing Explain whether a statement is correct or incorrect. Includes addition and subtraction, and multiplication by 2 to enumerate possibilities.

Expected Explain whether a statement is correct or incorrect. Includes all 4 operations and whole numbers, with some decimals and fractions to enumerate possibilities.

Greater Depth Explain whether a statement is correct or incorrect. Includes all 4 operations and whole, decimal and negative numbers and fractions to enumerate possibilities.

Questions 2, 5 and 8 (Reasoning)

Developing Explain which statement could be true. Includes addition and subtraction, and multiplication by 2 to enumerate possibilities.

Expected Explain which statement could be true. Includes all 4 operations and whole numbers, with some decimals and fractions to enumerate possibilities.

Greater Depth Explain which statement could be true. Includes all 4 operations and whole numbers, with some decimals and fractions to enumerate possibilities.

Questions 3, 6 and 9 (Problem Solving)

Developing Find the possible values of two letters to make a total. Includes addition and subtraction, and multiplication by 2 to enumerate possibilities.

Expected Find the possible values of two letters to make a total. Includes all 4 operations and whole numbers, with some decimals and fractions to enumerate possibilities.

Greater Depth Find the possible values of two letters to make a total. Includes all 4 operations and whole numbers, with some decimals and fractions to enumerate possibilities.

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Enumerate Possibilities

1a. Katya is trying to find all the possibilities for a and b .

$$2a + b = 25$$



If $a = 9$,
 b must = 7

Is Katya correct? Explain your answer.



R

Enumerate Possibilities

1b. Jesse is trying to find all the possibilities for c and d .

$$2c - d = 12$$



If $c = 10$,
 d must = 2

Is Jesse correct? Explain your answer.



R

2a. If a is an odd number and b is 2, which of these could be true?

A. $2a + 2b = 14$

B. $a \times b = 9$

C. $2a \times b = 12$

D. $a + 2b = 9$

Convince me.



R

2b. If a is 5 and b is an even number, which of these could be true?

A. $a + 2b = 12$

B. $2a + b = 16$

C. $2a \times b = 20$

D. $a + b = 8$

Convince me.



R

3a. Pizza 2 Go sells 2 medium pizzas and one small pizza for £22. What possible prices can you find for each pizza?

$$2m + s = £22$$

m	s



PS

3b. Hippy Hats sell 2 knitted hats and 2 baseball caps for £80. What possible prices can you find for each hat?

$$2k + 2b = £80$$

k	b



PS

Enumerate Possibilities

4a. Vivian is trying to find all the possibilities for g and f .

$$5g + 3f = 50$$



If $g = 7$,
 f must = 15

Is Vivian correct? Explain your answer.



R

Enumerate Possibilities

4b. Ralph is trying to find all the possibilities for x and y .

$$2x + 5y = 40$$



If $x = 15$,
 y must = 10

Is Ralph correct? Explain your answer.



R

5a. If a is an odd number and b is 0.5, which of these could be true?

- A. $2a + 3b = 7.5$
- B. $a + a - 4b = 3$
- C. $4a + 5b = 22.5$
- D. $3a + 3b = 17.5$

Convince me.



R

5b. If a is a decimal number and b is 4, which of these could be true?

- A. $5a + b = 15$
- B. $3a + 3b = 13.5$
- C. $2a + 5b = 21$
- D. $2a \times b = 12$

Convince me.



R

6a. Coats 'r' Us sell 2 medium coats and 4 small coats for £100. What possible prices can you find for each coat?

$$2m + 4s = £100$$

m	s



PS

6b. Yum Wings sell 4 small chicken dippers and 2 large chicken buckets for £80. What possible prices can you find for each meal?

$$4s + 2l = £80$$

s	l



PS

Enumerate Possibilities

7a. Gillian is trying to find all the possibilities for x and y .

$$7x + 2y = 28.5$$



If $x = 2$,
 y must = 14.5

Is Gillian correct? Explain your answer.



R

Enumerate Possibilities

7b. Faisan is trying to find all the possibilities for a and b .

$$2a - 5b = -5$$



If $a = 2.5$,
 b must = 10

Is Faisan correct? Explain your answer.



R

8a. If a is a negative number and b is 7, which of these could be true?

- A. $a + b = 0$
- B. $a + 3b = 16$
- C. $a + 8b = 46$
- D. $a + 2b - b = 3$

Convince me.



R

8b. If a is -5 and b is a decimal number, which of these could be true?

- A. $a + b = -2.5$
- B. $a + 3b = -3.5$
- C. $a + 2b - b = 5.5$
- D. $a - b = -9.5$

Convince me.



R

9a. CinePlaza sell 2 medium popcorn and 2 small popcorn for £17.50. What possible prices can you find for each popcorn?

$$2m + 2s = £17.50$$

m	s



PS

9b. Warm Wear sell 5 mittens and 5 hats for £22.50. What possible prices can you find for each item?

$$5m + 5h = £22.50$$

m	h



PS

Reasoning and Problem Solving

Enumerate Possibilities

Developing

- 1a. Katya is correct because she has correctly multiplied 2×9 to make 18.
 $25 - 18 = 7$; $b = 7$
- 2a. C or D could be true. If $a = 5$ then D would be true; if $a = 3$, then C would be true.
- 3a. Various possible answers, for example:
 $m = 10, s = 2$; $m = 8, s = 6$; $m = 7, s = 8$

Expected

- 4a. Vivian is incorrect because she has forgotten that f needs multiplying by 3.
 $5 \times 7 = 35$; $50 - 35 = 15$; $15 \div 3 = 5$; $f = 5$
- 5a. A or C could be true. If $a = 5$, then C would be true; if $a = 3$, then A would be true.
- 6a. Various possible answers, for example:
 $m = 30, s = 10$; $m = 40, s = 5$; $m = 10, s = 20$

Greater Depth

- 7a. Gillian is incorrect because she has forgotten that y needs multiplying by 2.
 $7 \times 2 = 14$; $28.5 - 14 = 14.5$; $14.5 \div 2 = 7.25$
 $y = 7.25$
- 8a. A, B, C or D could be true. If $a = -5$, then A would be true. If $a = -5$, then B could be true. If $a = -10$, then C would be true; if $a = -4$, then D could be true.
- 9a. Various possible answers, for example:
 $m = 5, s = 3.75$; $m = 6, s = 2.75$; $m = 4, s = 4.75$

Reasoning and Problem Solving

Enumerate Possibilities

Developing

- 1b. Jesse is incorrect because he has forgotten to multiply c by 2 and then take away d . $2 \times 10 = 20$; $20 - 8 = 12$; $d = 8$
- 2b. B or C could be true. If $b = 6$, then B would be true; if $b = 2$, then C would be true.
- 3b. Various possible answers, for example:
 $k = 15, b = 25$; $k = 10, b = 30$; $k = 11, b = 29$

Expected

- 4b. Ralph is incorrect because he has forgotten that y needs multiplying by 5.
 $2 \times 15 = 30$; $40 - 30 = 10$; $10 \div 5 = 2$; $y = 2$
- 5b. A, B, C or D could be true. If $a = 2.2$, then A would be true; if $a = 0.5$, then B and C would be true; if $a = 1.5$, then D would be true.
- 6b. Various possible answers, for example:
 $s = 10, l = 20$; $s = 5, l = 30$; $s = 11, l = 18$

Greater Depth

- 7b. Faisan is incorrect because he has forgotten that b needs multiplying by 5.
 $2 \times 2.5 = 5$; $5 - 10 = -5$; $10 \div 5 = 2$; $b = 2$
- 8b. A, B, C or D could be true. If $b = 2.5$, then A would be true; if $b = 1.5$, then B would be true; if $b = 10.5$, then C would be true; if $b = 4.5$, then D would be true.
- 9b. Various possible answers, for example:
 $m = 1, h = 3.5$; $m = 2, h = 2.5$; $m = 3, h = 1.5$