

# Reasoning and Problem Solving

## Step 1: Fact Families

### National Curriculum Objectives:

Mathematics Year 2: (2C1) [Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100](#)

Mathematics Year 2: (2C3) [Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and missing number problems](#)

### Differentiation:

Questions 1, 4 and 7 (Problem Solving)

**Developing** Questions to support understanding of the relationship between addition and subtraction and knowing the purpose of the equals sign as well as the addition and subtraction signs, Complete a bar model with all possible combinations of numbers from 15 to 30.

**Expected** Complete a part whole model with all possible combinations of numbers to 20.

**Greater Depth** Complete a part whole model with all possible combinations of numbers to 30.

Questions 2, 5 and 8 (Problem Solving)

**Developing** Read a simple word problem and write the corresponding fact family within 10.

**Expected** Read a simple word problem and write the corresponding fact family within 20.

**Greater Depth** Read a simple word problem and write the corresponding fact family within 30.

Questions 3, 6 and 9 (Reasoning)

**Developing** Prove whether three given numbers can be used to write a fact family within 10.

**Expected** Prove whether three given numbers can be used to write a fact family within 20.

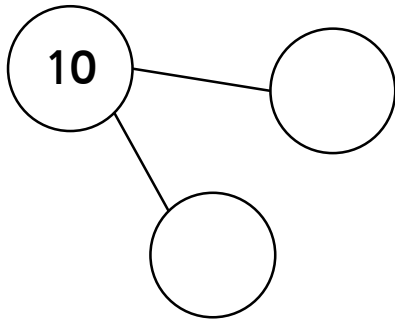
**Greater Depth** Prove whether three given numbers can be used to write a fact family within 30.

[More resources](#) which follow the same small steps as White Rose.

Did you like this resource? Don't forget to [review](#) it on our website.

# Reasoning and Problem Solving – Fact Families

1a. What pairs of numbers complete the part whole model?

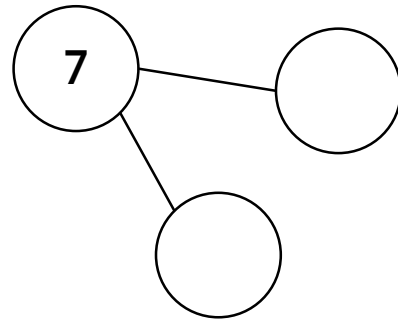


Choose one set and write the fact family for it.



PS

1b. What pairs of numbers complete the part whole model?



Choose one set and write the fact family for it.



PS

2a. Norma is counting the pencils in her pencil case. There are 3 blue pencils and 7 pink pencils.

Write four number facts to represent the pencils in her pencil case.



PS

2b. Richard is counting the books on the shelf. There are 5 big books and 4 small books.

Write four number facts to represent the books on the shelf.



PS

3a. Dawn says,



I can use the numbers 4, 2 and 6 to write a fact family.

Is she correct? Prove it.



R

3b. Chris says,



I can use the numbers 2, 3 and 4 to write a fact family.

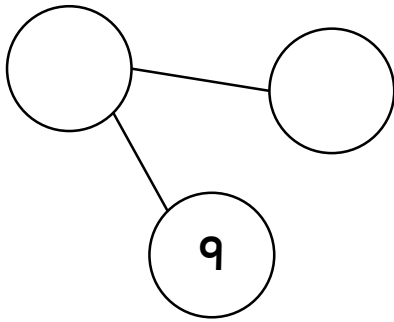
Is he correct? Prove it.



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# Reasoning and Problem Solving – Fact Families

4a. What pairs of numbers complete the part whole model?

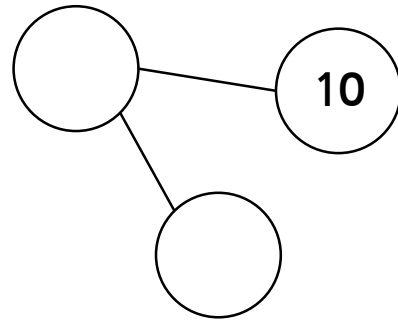


Choose one set and write the fact family for it.



PS

4b. What pairs of numbers complete the part whole model?



Choose one set and write the fact family for it.



PS

5a. Paul is counting the flowers in his garden. There are 6 blue flowers and 8 orange flowers.

Write four number facts to represent the flowers in his garden.



PS

5b. Pam is counting the buttons in her coat. There are 5 brown buttons and 7 white buttons.

Write four number facts to represent the buttons on her coat.



PS

3a. Suzie says,



I can use the numbers 15, 7 and 7 to write a fact family.

Is she correct? Prove it.



R

3b. Rylan says,



I can use the numbers 4, 9 and 13 to write a fact family.

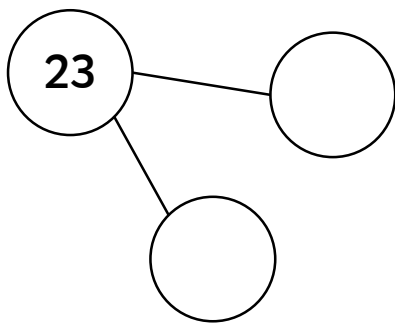
Is he correct? Prove it.



R

# Reasoning and Problem Solving – Fact Families

7a. What pairs of numbers complete the part whole model?

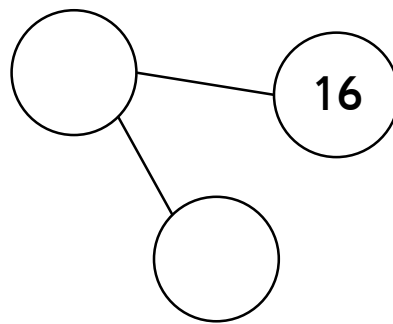


Choose one set and write the fact family for it.



PS

7b. What pairs of numbers complete the part whole model?



Choose one set and write the fact family for it.



PS

8a. John is counting the Vegetables in his vegetable patch There are 12 turnips and 13 carrots. He eats 5 carrots.

Write four number facts to represent the remaining vegetables in the vegetable patch.



PS

8b. Rhoda is counting the fruit in a fruit bowl. There are 10 grapes and 15 strawberries. She eats 3 strawberries.

Write four number facts to represent the remaining fruit in the fruit bowl.



PS

9a. Christine says,



I can use the numbers 15, 10 and 26 to write a fact family.

Is she correct? Prove it.



R

9b. Ian says,



I can use the numbers 21, 30 and 19 to write a fact family.

Is he correct? Prove it.



R

# Reasoning and Problem Solving – Fact Families

## Developing

- 1a. Various answers, for example:  $1 + 9 = 10$ ,  $2 + 8 = 10$ ,  $3 + 7 = 10$ . Check fact families are correct.
- 1b. Various answers, for example:  $1 + 6 = 7$ ,  $2 + 5 = 7$ ,  $3 + 4 = 7$ . Check fact families are correct.
- 2a.  $3 + 7 = 10$ ,  $7 + 3 = 10$ ,  $10 - 3 = 7$ ,  $10 - 7 = 3$
- 2b.  $5 + 4 = 9$ ,  $4 + 5 = 9$ ,  $9 - 5 = 4$ ,  $9 - 4 = 5$
- 3a. Dawn is correct because  $2 + 4 = 6$ , so she can create a fact family using these three numbers.
- 3b. Chris is incorrect because  $2 + 3 = 5$ , not 4 so he cannot make a fact family using these three numbers.

## Expected

- 4a. Various answers, for example:  $1 + 9 = 10$ ,  $2 + 9 = 11$ ,  $3 + 9 = 12$ . Check fact families are correct.
- 4b. Various answers, for example:  $10 + 1 = 11$ ,  $10 + 2 = 12$ ,  $10 + 3 = 13$ . Check fact families are correct.
- 5a.  $6 + 8 = 14$ ;  $8 + 6 = 14$ ;  $14 - 6 = 8$ ;  $14 - 8 = 6$
- 5b.  $5 + 7 = 12$ ;  $7 + 5 = 12$ ;  $12 - 7 = 5$ ;  $12 - 5 = 7$
- 6a. Suzie is incorrect because  $7 + 7 = 14$ , not 15 so she cannot make a fact family using these three numbers.
- 6b. Rylan is correct because  $9 + 4 = 13$  so he can make a fact family using these three numbers.

## Greater Depth

- 7a. Various answers, for example:  $23 = 22 + 1$ ,  $23 = 21 + 2$ ,  $23 = 20 + 3$ . Check fact families are correct.
- 7b. Various answers, for example:  $16 + 1 = 17$ ,  $15 + 2 = 17$ ,  $14 + 3 = 17$ . Check fact families are correct.
- 8a.  $13 + 12 - 5 = 20$ ;  $12 + 13 - 5 = 20$ ;
- 8b.  $10 + 15 - 3 = 22$ ;  $15 + 10 - 3 = 22$ ;
- 9a. Christine is incorrect because  $15 + 10 = 25$ , not 26 so she cannot make a fact family using these three numbers.
- 9b. Ian is incorrect because  $19 + 21 = 40$ , not 30 so he cannot make a fact family using these three numbers.