MATHEMATICAL SKILLS

RATIOS
AND
ASSOCIATED EXAMINATION QUESTIONS

DESIGN AND TECHNOLOGY

WORLD ASSOCIATION OF TECHNOLOGY TEACHERS https://www.facebook.com/groups/254963448192823/ www.technologystudent.com © 2017 V.Ryan © 2017

RATIOS - EXAMPLES

DEFINITION:

A ratio is the mathematical relationship between two or more numbers.

An example of a ratio is:

4:1

Here we see 4 blue circles compared to 1 red circle.

An example of a ratio is:

3:2

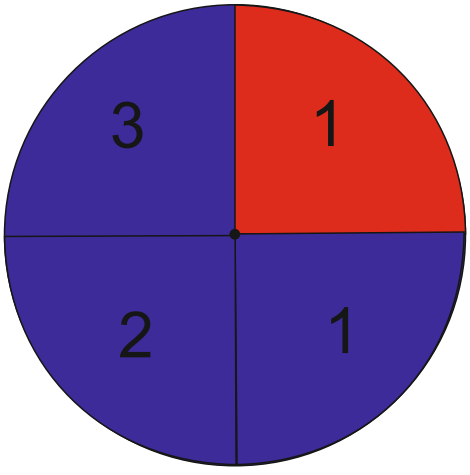
Here we see 3 blue circles compared to 2 red circles.

An example of a ratio is:

2:3

Here we see 2 blue circles compared to 3 red circles.

The circle below shows the area of blue in ratio with the area of red. There are 3 areas of red to just 1 area of blue.



BLUE : RED

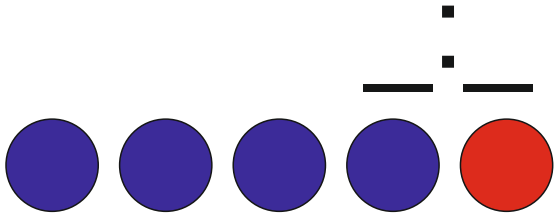
3:1

RATIOS - QUESTIONS

DEFINITION:

A ratio is the mathematical relationship between two or more numbers.

1. What is the ratio of blue to red dots?:



EXPLANATION: _____

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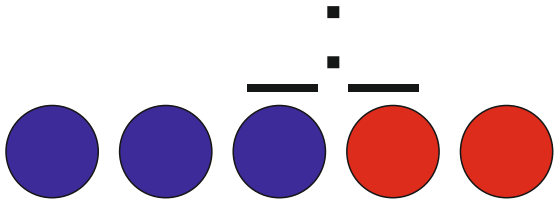
2. What is the ratio of blue to red dots?:



EXPLANATION: _____

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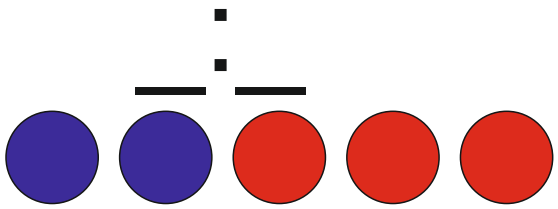
_____

2. What is the ratio of blue to red dots?:



EXPLANATION: _____

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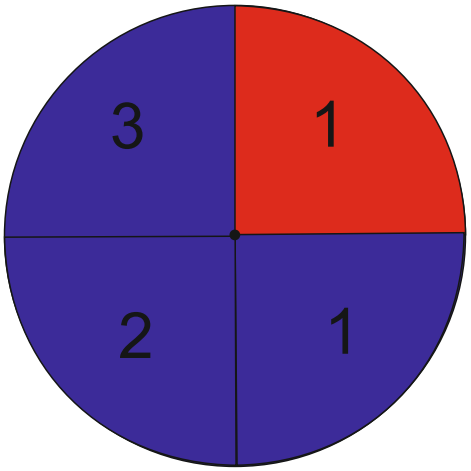
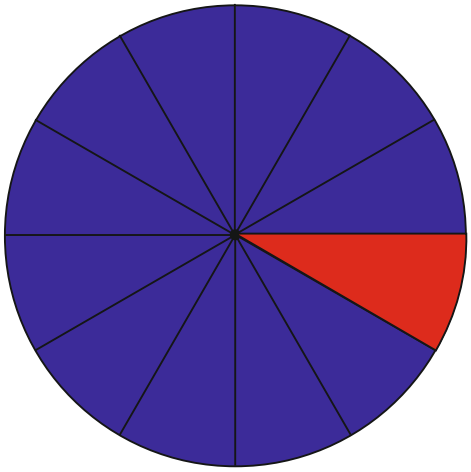
The circle below shows the area of blue in ratio with the area of red. What is the ratio of blue to red?



BLUE : RED

RATIOS - EXAMPLES

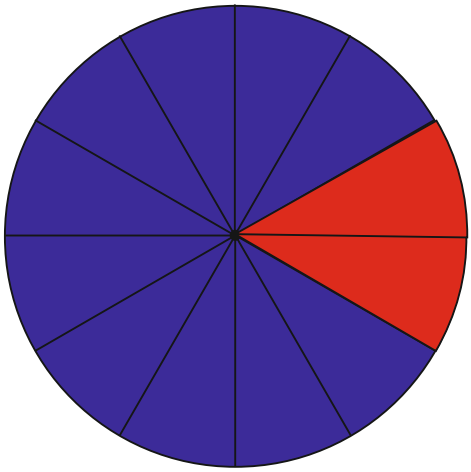
What is the ratio of the blue area to the red area?



BLUE : RED

11:1

The circle below is divided into blue and red areas. The ratio of the blue to the red is 10:2, because there are 10 blue sections compared to the 2 red sections. This is the same as 5:1



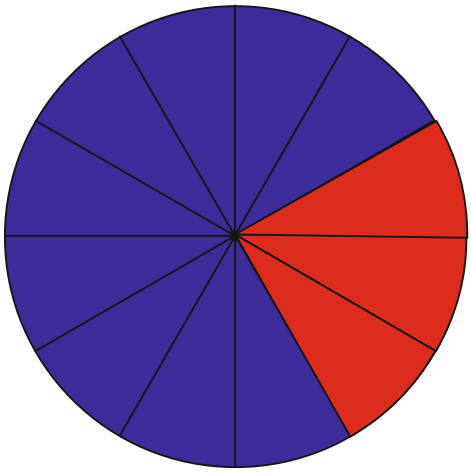
BLUE : RED

10:2

Which is the same as,

5:1

The circle below is divided into blue and red areas. The ratio of the blue to the red is 9:3, because there are 10 blue sections compared to the 2 red sections. This is the same as 5:1



BLUE : RED

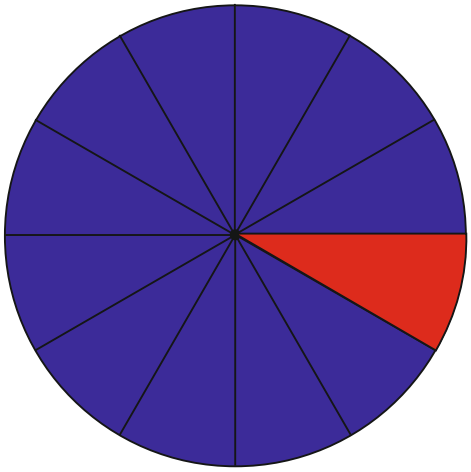
9:3

Which is the same as,

3:1

RATIOS - QUESTIONS

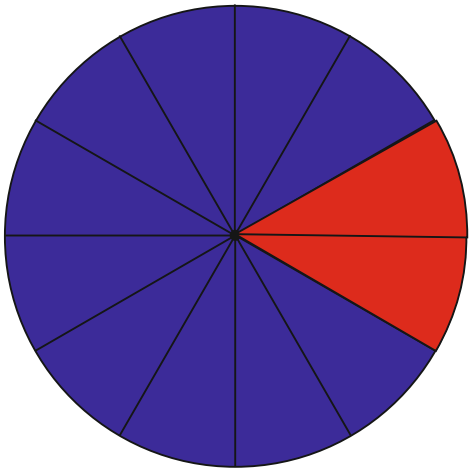
What is the ratio of the blue area to the red area?



BLUE : RED

_ : _

The circle below is divided into blue and red areas. What is the ratio of blue to red sections?



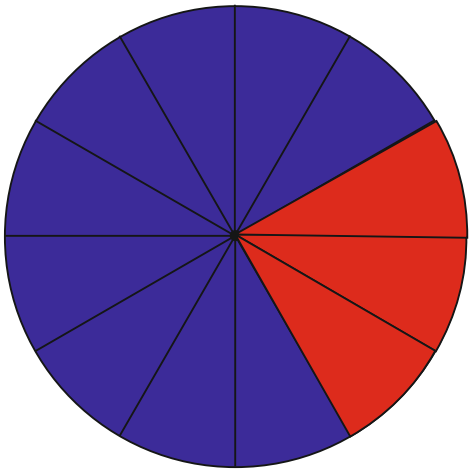
BLUE : RED

_ : _

Which is the same as,

_ : _

The circle below is divided into blue and red areas. What is the ratio of blue to red sections?



BLUE : RED

_ : _

Which is the same as,

_ : _

RATIOS - EXAMPLES

Part of a recipe to serve two people, requires 4 cups of flour and 1 cup of water.

If the has to be scaled up to serve 10 people, how many cups of flour and water will be required as part of the recipe.

	FLOUR		WATER
SERVES TWO PEOPLE =	4	:	1

To find the number by which the original ratio numbers are multiplied, divide the new number of people to be served (10) by the old number of people to be served (2).

$$\frac{10 \text{ PEOPLE}}{2 \text{ PEOPLE}} = 5$$

Then, multiply each number of the original ratio by the answer 5, to find the new amount of flour and water.

	4x5	:	1x5

The new number of cups of flour and water are seen opposite

FLOUR		WATER
20	:	5

If the has to be scaled up to serve 12 people, how many cups of flour and water will be required as part of the recipe.

	FLOUR		WATER
SERVES TWO PEOPLE =	4	:	1

To find the number by which the original ratio numbers are multiplied, divide the new number of people to be served (12) by the old number of people to be served (2).

$$\frac{12 \text{ PEOPLE}}{2 \text{ PEOPLE}} = 6$$

Then, multiply each number of the original ratio by the answer 6, to find the new amount of flour and water.

	4x6	:	1x6

The new number of cups of flour and water are seen opposite

FLOUR		WATER
24	:	6

RATIOS - QUESTIONS

Part of a recipe to serve two people, requires 4 cups of flour and 1 cup of water.

If the has to be scaled up to serve 10 people, how many cups of flour and water will be required as part of the recipe.

	FLOUR		WATER
SERVES TWO PEOPLE =	4	:	1

EXPLANATION:

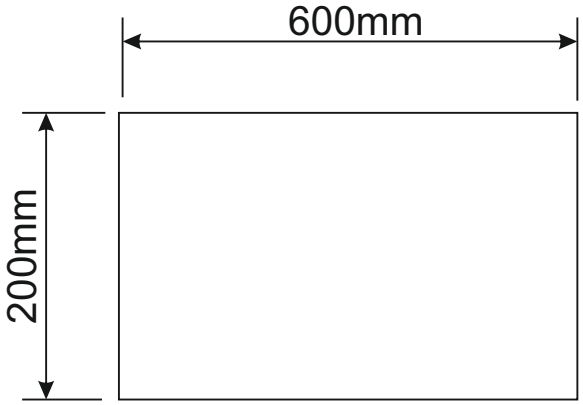
If the has to be scaled up to serve 12 people, how many cups of flour and water will be required as part of the recipe.

	FLOUR		WATER
SERVES TWO PEOPLE =	4	:	1

EXPLANATION:

USING RATIOS TO SCALE DRAWINGS - EXAMPLES

The rectangle seen opposite has a height of 200mm and a length of 600



The ratio of the HEIGHT to the LENGTH is worked out by dividing the large number by the smaller number.

HEIGHT : LENGTH

$$\frac{600}{200} = 3$$

This means that the ratio is:

1:3

If the height is to be increased to 400mm and the ratio between the height and length is the same, what is the new measurement of the length?

1:3

400mm : ?

Quite simply multiply the 400mm by 3 to find the new measurement of the length

400 x 3 = 1200

400mm : 1200mm

If the height is to be increased to 600mm and the ratio between the height and length is the same, what is the new measurement of the length?

1:3

600mm : ?

Quite simply multiply the 600mm by 3 to find the new measurement of the length

600 x 3 = 1800

600mm : 1800mm

USING RATIOS TO SCALE DRAWINGS - EXAMPLES

If the height is to be increased to 500mm and the ratio between the height and length is the same, what is the new measurement of the length?

1:3

500mm : ?

Quite simply multiply the 400mm by 3 to find the new measurement of the length

500 x 3 = 1500

500mm : 1500mm

If the height is to be decreased to 100mm and the ratio between the height and length is the same, what is the new measurement of the length?

1:3

100mm : ?

Quite simply multiply the 400mm by 3 to find the new measurement of the length

100 x 3 = 300

100mm : 300mm

If the height is to be decreased to 800mm and the ratio between the height and length is the same, what is the new measurement of the length?

1:3

800mm : ?

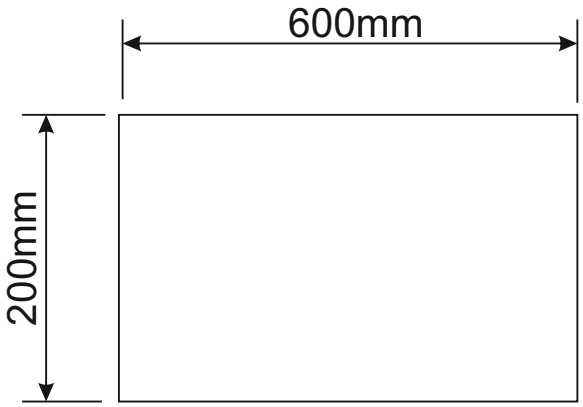
Quite simply multiply the 400mm by 3 to find the new measurement of the length

800 x 3 = 2400

800mm : 2400mm

USING RATIOS TO SCALE DRAWINGS - QUESTIONS

The rectangle seen opposite has a height of 200mm and a length of 600



The ratio of the HEIGHT to the LENGTH is worked out by dividing the large number by the smaller number.

HEIGHT : LENGTH

$$\frac{600}{200} = 3$$

This means that the ratio is:

1:3

If the height is to be increased to 400mm and the ratio between the height and length is the same, what is the new measurement of the length?

1:3

400mm : ?

EXPLANATION: _____

_____

CALCULATION:

If the height is to be increased to 600mm and the ratio between the height and length is the same, what is the new measurement of the length?

1:3

600mm : ?

EXPLANATION: _____

_____

CALCULATION:

USING RATIOS TO SCALE DRAWINGS - QUESTIONS

If the height is to be increased to 500mm and the ratio between the height and length is the same, what is the new measurement of the length?

1:3

500mm : ?

EXPLANATION:

CALCULATION:

If the height is to be decreased to 100mm and the ratio between the height and length is the same, what is the new measurement of the length?

1:3

100mm : ?

EXPLANATION:

CALCULATION:

If the height is to be decreased to 800mm and the ratio between the height and length is the same, what is the new measurement of the length?

1:3

800mm : ?

EXPLANATION:

CALCULATION:

FURTHER EXAMPLE QUESTIONS

PART ONE

The question is about alternative energy. A local wind farm produces 4 terawatt hours of electricity over a year. At the same time, a solar farm produced 0.5 terawatt hours of electrical power. What is the ratio Wind farm : Solar Power ?

WIND FARM	:	SOLAR POWER
4	:	0.5

To ensure that final ratio is in whole numbers, divide the wind power total by the solar power total.

$$\frac{\text{WIND FARM}}{\text{SOLAR POWER}} = \frac{4}{0.5} = 8$$

Then take the answer and place it on the wind power side of the ratio and the 1 on the solar power side.

WIND FARM	:	SOLAR POWER
8	:	1

PART TWO

The total alternative energy produced by the wind farm is 4 terawatt hours. The ratio between wind power and all other forms of alternative energy produced in the area is 1:6. What is the total amount of energy produced by the other alternative energy forms?

WIND FARM	:	ALL OTHER FORMS OF ALTERNATIVE ENERGY
1	:	6
4 terawatt hours	:	?

To calculate the answer, take the 4 terawatts and multiply by 6.

4 terawatts x 6 = 24 terawatt hours produced by all other forms of alternative energy

FURTHER EXAMPLE QUESTIONS

The total amount of renewable energy produced in 2016 was 90 Terawatt hours (Twh).

The ratio of hydroelectricity compared to other renewable energy forms was 1:12.

What amount of energy was produced through hydroelectricity ?

HYDROELECTRICITY : OTHER RENEWABLE FORMS

1 : 12

Add both numbers (1 and 12) together. This gives us 13

Then, divide the total amount of renewable energy (90 terawatt hours) by 13

$$\frac{90}{13} = 6.92 \text{ terawatt hours}$$

If total amount of renewable energy produced in 2016 was 100 Terawatt hours (Twh) AND the ratio of hydroelectricity compared to other renewable energy forms was 1:9.

What amount of energy was produced through hydroelectricity ?

HYDROELECTRICITY : OTHER RENEWABLE FORMS

1 : 9

Add both numbers (1 and) together. This gives us 10

Then, divide the total amount of renewable energy (100 terawatt hours) by 10.

$$\frac{100}{10} = 10 \text{ terawatt hours}$$

FURTHER QUESTIONS

PART ONE

The question is about alternative energy. A local wind farm produces 4 terawatt hours of electricity over a year. At the same time, a solar farm produced 0.5 terawatt hours of electrical power. What is the ratio Wind farm : Solar Power ?

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EXPLANATION: _____

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WIND FARM	:	ALL OTHER FORMS OF ALTERNATIVE ENERGY
1	:	6

EXPLANATION: _____

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FURTHER QUESTIONS

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HYDROELECTRICITY : OTHER RENEWABLE FORMS

1 : 12

EXPLANATION: _____

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HYDROELECTRICITY : OTHER RENEWABLE FORMS

1 : 9

EXPLANATION: _____

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