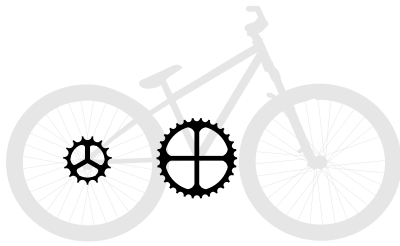


Working With Ratio – Gear Ratios **Answers**

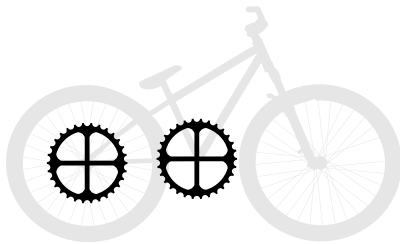
Almost all bikes have one or more gears towards the front (driven by pedalling) and one or more gears at the rear (which drive the wheel). The different numbers of teeth (the bits that stick out from the edge of the gear) at the front, compared to the rear, change how difficult it is to pedal.

Gears on bikes are not always the same – gear 2 on one bike might be different to gear 2 on another bike. To compare them, you need to know the gear ratio. We can work this out by writing the ratio of the number of teeth on the rear gear to the number of teeth on the front gear.

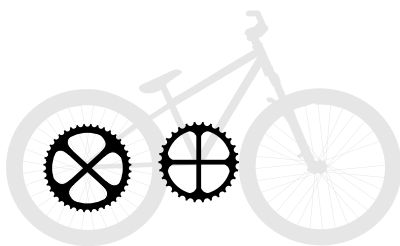
Here are some examples of different gear ratios – the size of each gear is exaggerated – they would never be this big in real life!



- Here, there are 15 teeth at the rear and 30 at the front.
- This is a gear ratio of 15:30, which simplifies to 1:2.
- This will be difficult to pedal, but fast. You would use this gear when pushing hard on the flat or going downhill.



- In this gear, there are 30 teeth at the front and 30 at the back.
- This is a gear ratio of 30:30, which simplifies to 1:1.
- This would be easy to pedal, but not very fast. You would use this gear when cycling up a moderate hill.



- Here, there are 40 teeth at the back and 30 at the front.
- This is a gear ratio of 40:30, which we can write as 1:0.75.
- This would be very easy to pedal, but very slow. You could use this to go up a very steep hill.

The first number is always the number of teeth on the rear gear; the second number is the number of teeth on the front gear.

We can write gear ratios in the form 1: n . This tells us how many times (n) the back wheel goes round each time you pedal one full revolution. In the first example, the rear wheel has to go round twice each time you pedal – this is what makes pedalling harder, but means you go faster. In the third example, the rear wheel only does three quarters of a turn each time you pedal – this is easier, but not as fast.

Different sorts of bikes tend to have different gear ratios. Road bikes usually have harder gear ratios (the n in 1: n is bigger), because they're designed to go fast on a smooth surface. Mountain bikes have easier gear ratios (the n in 1: n is smaller), to handle rougher terrain at slower speeds. BMXs usually have a single, fairly hard gear.

Where necessary, round to 1 decimal place.

1. In its hardest gear, a road bike has 55 teeth on the front gear and 11 in the rear.

a. What is its gear ratio? Give your answer in the form 1: n .

1:5

b. How many times does the rear wheel go round for each full pedal stroke?

5 times

2. A mountain biker has a 32-tooth gear at the front. Their easiest gear has 40 teeth. What is the gear ratio? Give your answer in the form 1: n .

1:0.8

3. A BMX has a 27-tooth gear at the front and a 9-tooth gear at the rear. How many revolutions of the rear wheel will result from one revolution of the pedals?

9:27 = 1:3

3 revolutions

4. Put these gear ratios in order from hardest to easiest:

15:30

11:33

26:13

36:27

28:42

11:33 (1:3)

15:30 (1:2)

28:42 (1:1.5)

36:27 (1:0.75)

26:13 (1:0.5)

5. Put these gear ratios in order, from easiest to hardest:

11:32

14:30

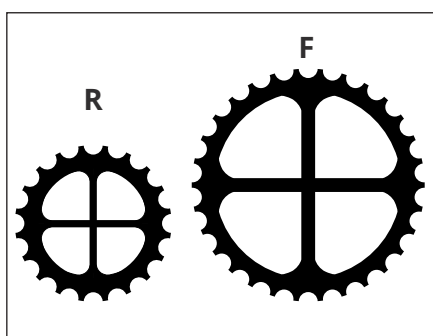
13:30

14:30 (1:2.1)

13:30 (1:2.3)

11:32 (1:2.9)

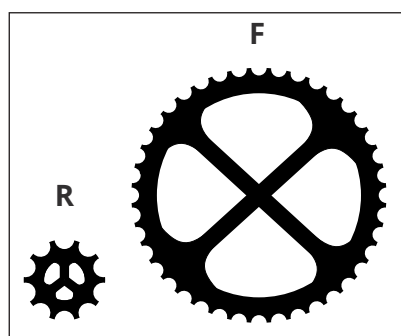
6. Put these gear pairs in order, from easiest to hardest:



20:30

1:1.5

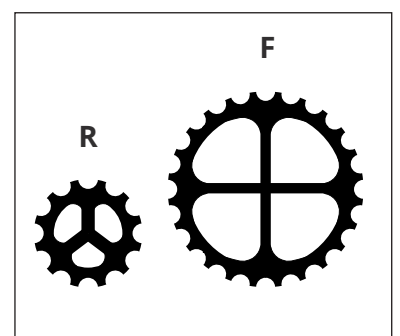
Easiest



10:40

1:4

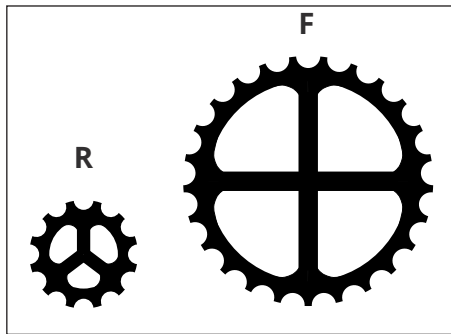
Hardest



12:24

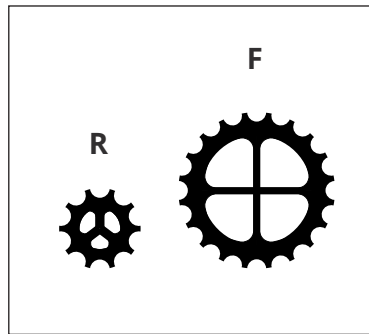
1:2

7. Put these gear pairs in order, from easiest to hardest:



12:25

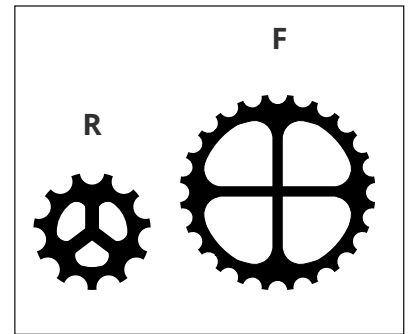
1:2.1



10:20

1:2

Easiest

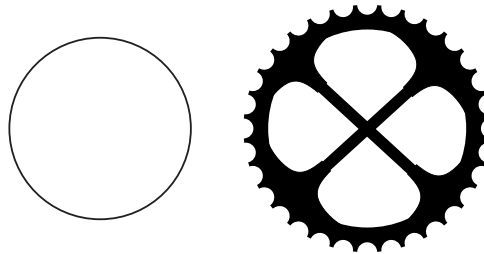


11:24

1:2.2

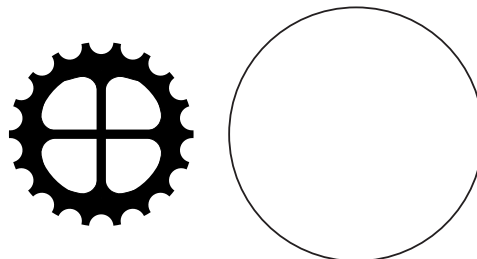
Hardest

8. A front gear is given below. Draw a rear gear that will result in a gear ratio of 1:2.



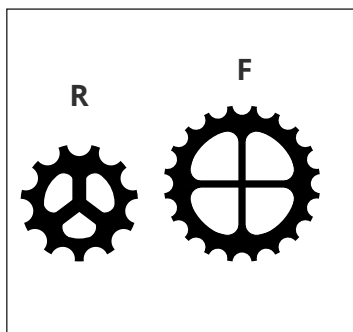
16:32

9. A rear gear is given below. Draw a front gear that will result in a gear ratio of 1:1.5.

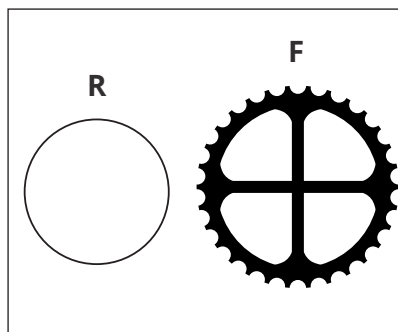


18:27

10. Three pairs of gears are given below. The middle set of gears are easier to pedal than the first set but harder to pedal than the third. How many teeth could be on the missing gear?



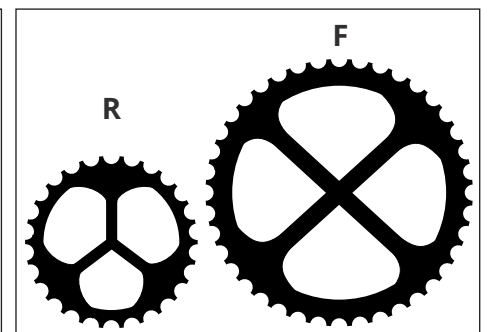
11:20



17:30

or 18:30

or 19:30



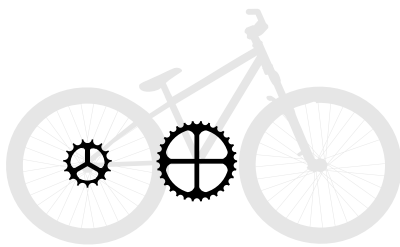
26:40

Working With Ratio – Gear Ratios

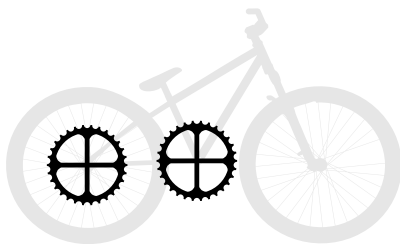
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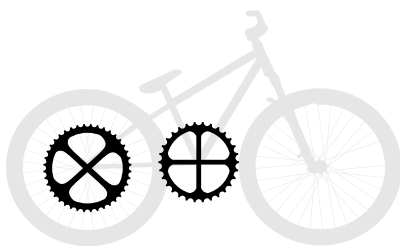
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 - b. How many times does the rear wheel go round for each full pedal stroke?
2. A mountain biker has a 32-tooth gear at the front. Their easiest gear has 40 teeth. What is the gear ratio? Give your answer in the form 1: n .
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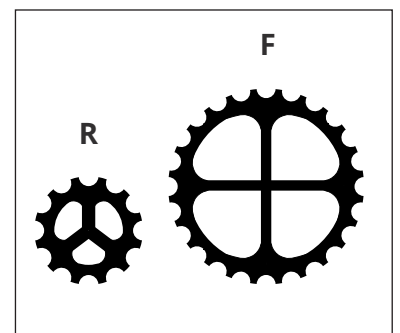
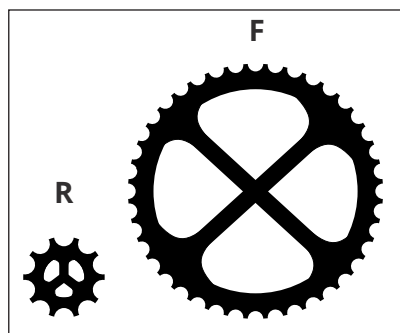
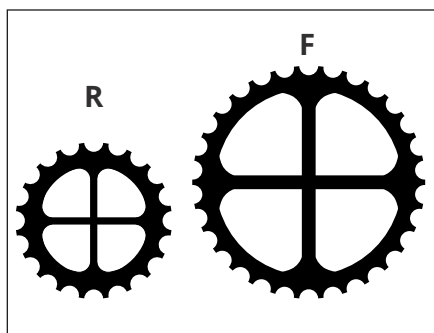
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11:32

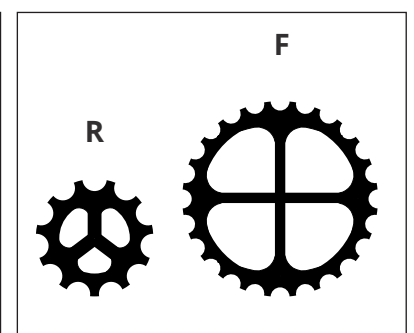
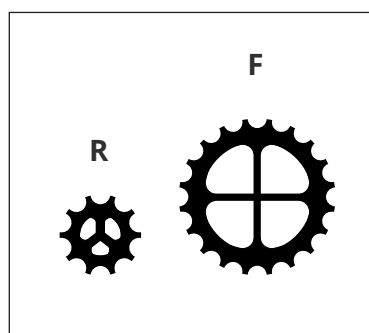
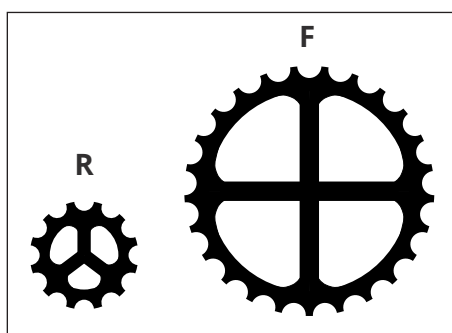
14:30

13:30

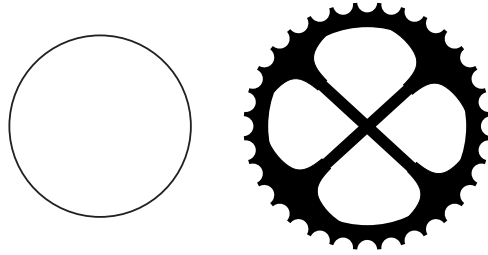
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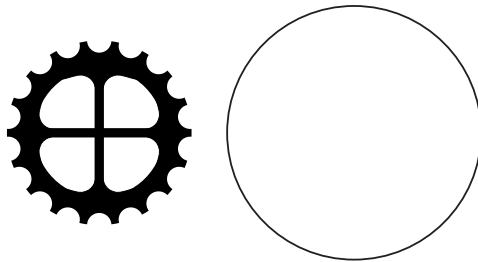
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