

Q1.

Figure 10 shows an arrangement of gears.

Each gear turns around a fixed axle.

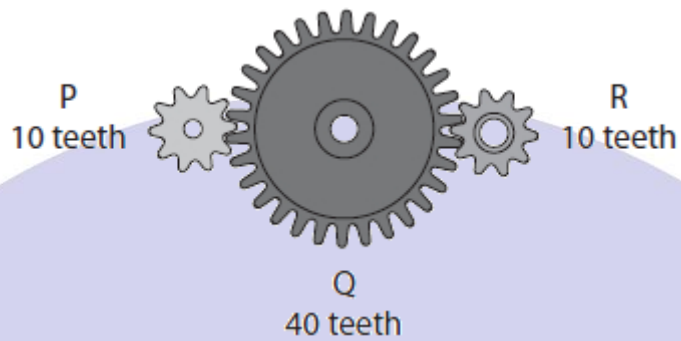


Figure 10

Gear P is turned through one complete revolution per second.

(i) Which of the following describes the motion of gear R?

(1)

	speed (revolutions per second)	direction of rotation
<input type="checkbox"/> A	4	same as P
<input type="checkbox"/> B	1	same as P
<input type="checkbox"/> C	4	opposite to P
<input type="checkbox"/> D	1	opposite to P

(ii) Figure 11 shows the same arrangement with gear R replaced by a rack.

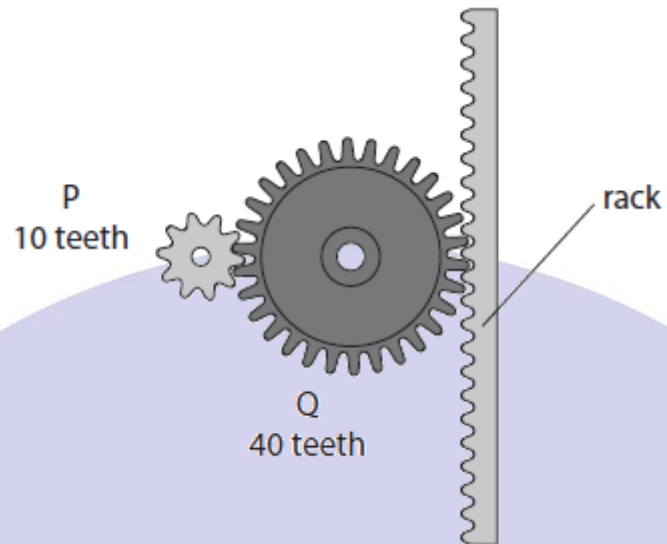


Figure 11

The rack can move up or down when the gears turn.

The teeth on the rack are 2 mm apart.

Calculate how far the rack moves when P turns through to one complete revolution.

(2)

distance = mm

(Total for question = 3 marks)

Q2.

Figure 14 show a rack and pinion system, used on a mountain railway.

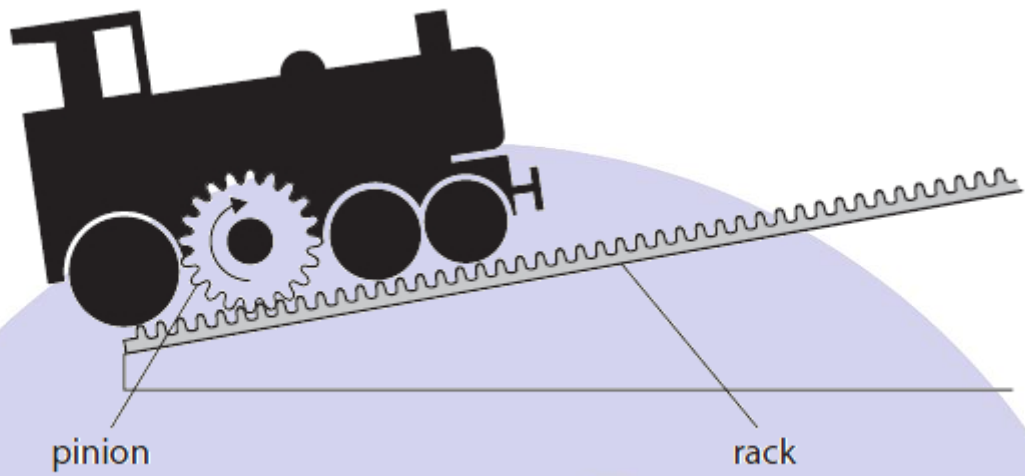


Figure 14

The teeth on the rack are 8.0 cm apart.

Calculate how far along the rack the train moves when the pinion turns through one complete revolution.

(2)

distance = m

(Total for question = 2 marks)

Q3.

Figure 8 shows a bicycle.

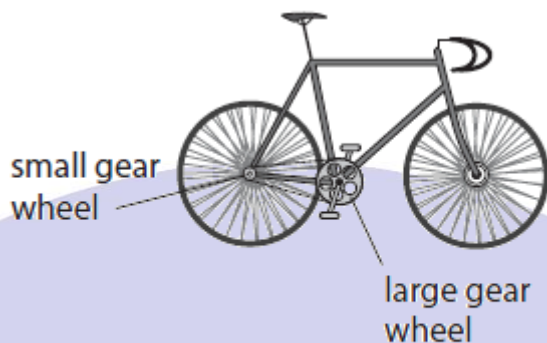


Figure 8

(i) The rider uses the pedals to make the large gear wheel turn.

The large gear wheel moves the chain.

The chain turns the small gear wheel.

The large gear wheel has 48 teeth.

The small gear wheel has 12 teeth.

The large gear wheel turns 2 times each second.

Calculate the number of times that the small gear wheel turns each second.

(2)

..... turns each second

(Total for question = 2 marks)