Motion Graphs

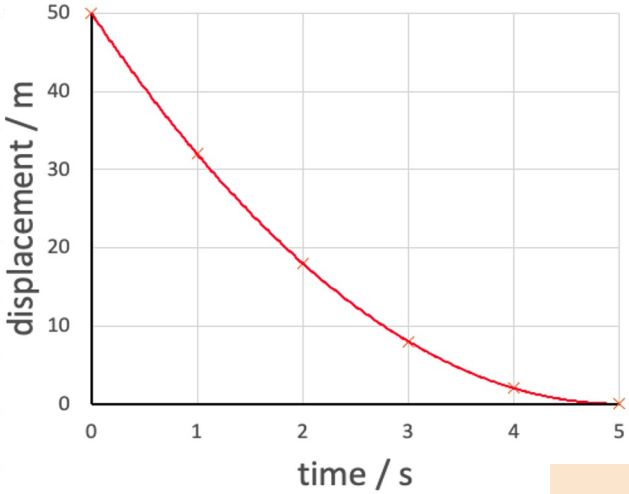
MODEL ANSWERS

As the displacement in all diagrams increase as we move to the right, going rightwards is defined as being the positive direction.

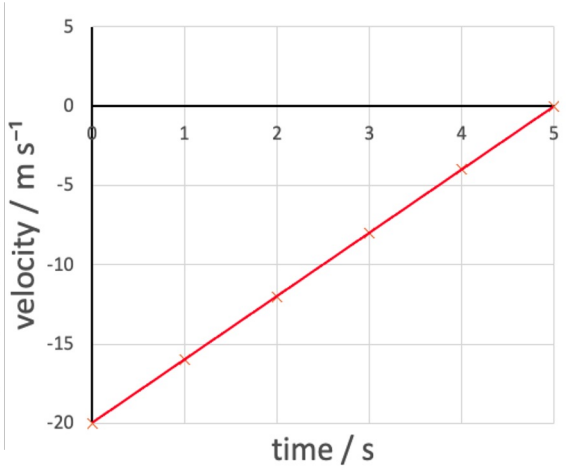
Group 1:

The car is moving to the left whilst slowing down.

time / s	displacement / m
0	50
1	32
2	18
3	8
4	2
5	0



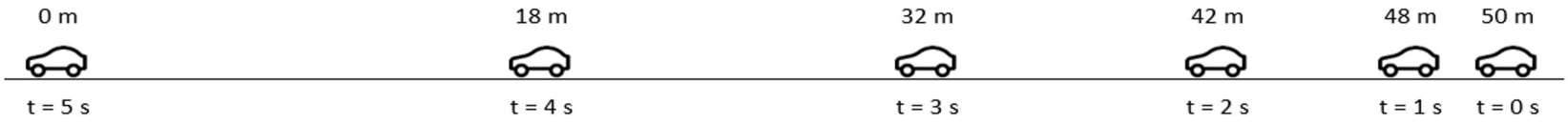
time / s	velocity / m s^{-1}
0	-20
1	-16
2	-12
3	-8
4	-4
5	0



s-t graph has a negative gradient. This tells us that the velocity will be negative (moving to the left).
The gradient is steep at first and becomes less steep. This tells us that the speed is decreasing.

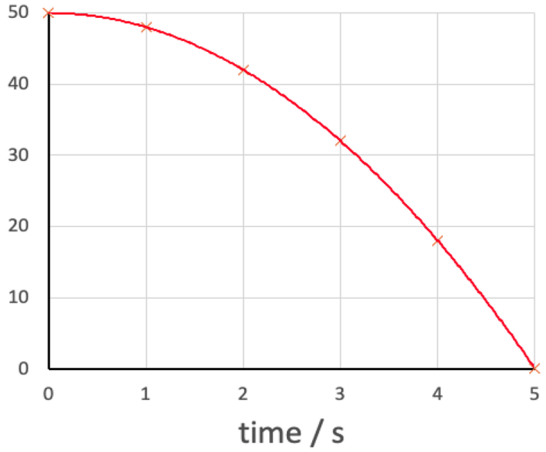
The gradient of the v-t graph is constant indicating a constant acceleration.
The gradient of the graph is positive (+4) indicating an acceleration of +4 m/s².
As the car is slowing down we could refer to this as a deceleration of 4 m/s².
At t=5.0 s the car is stationary.

Group 2:

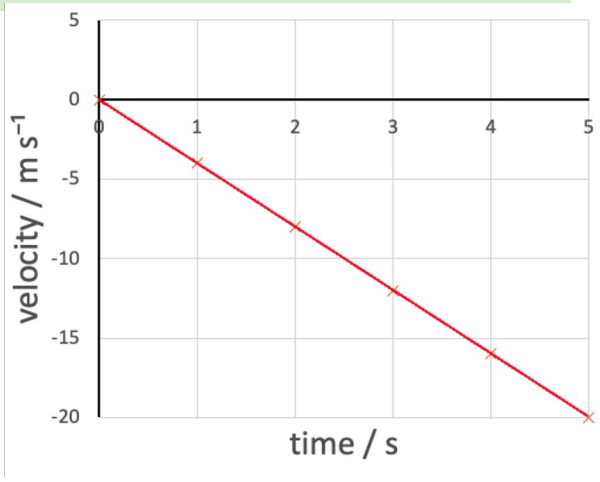


Car moves to the left whilst speeding up.

time / s	displacement / m
0	50
1	48
2	42
3	32
4	18
5	0



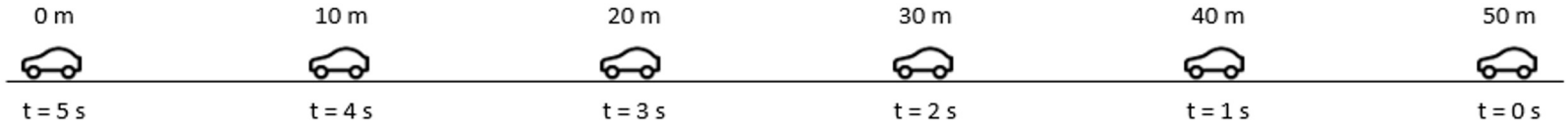
time / s	velocity / m s^{-1}
0	0
1	-4
2	-8
3	-12
4	-16
5	-20



s-t graph has a negative gradient. This tells us that the velocity will be negative (moving to the left). The gradient is shallow at first and becomes steeper with time. This tells us that the speed is increasing.

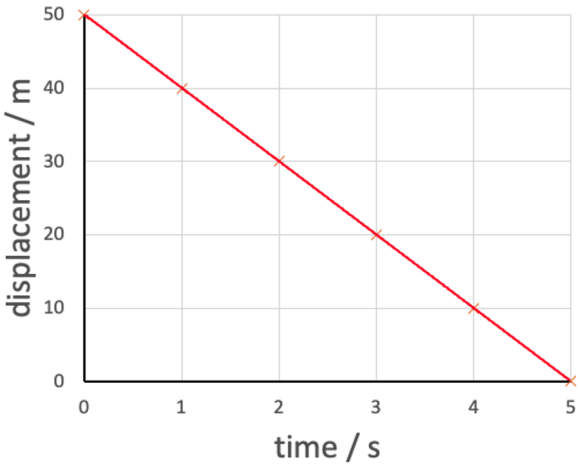
The gradient of the v-t graph is constant indicating a constant acceleration.
The car starts from rest.
The speed of the car is increasing.
The gradient of the graph is negative (-4) indicating an acceleration of -4 m/s^2.

Group 3:

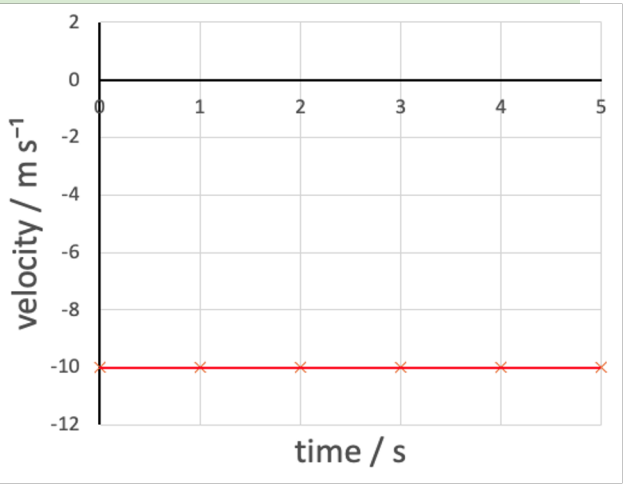


Car moves at a constant speed towards the left.

time / s	displacement / m
0	50
1	40
2	30
3	20
4	10
5	0



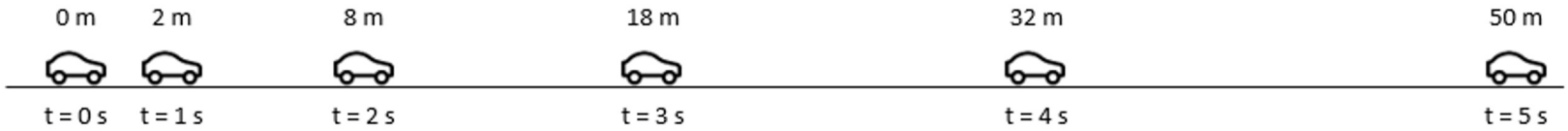
time / s	velocity / m s^{-1}
0	-10
1	-10
2	-10
3	-10
4	-10
5	-10



s-t graph has a negative gradient. This tells us the car is moving to the left.
The gradient is constant. This tells us that the velocity of the car is constant.
Gradient = -10. Meaning the velocity is -10 m/s.

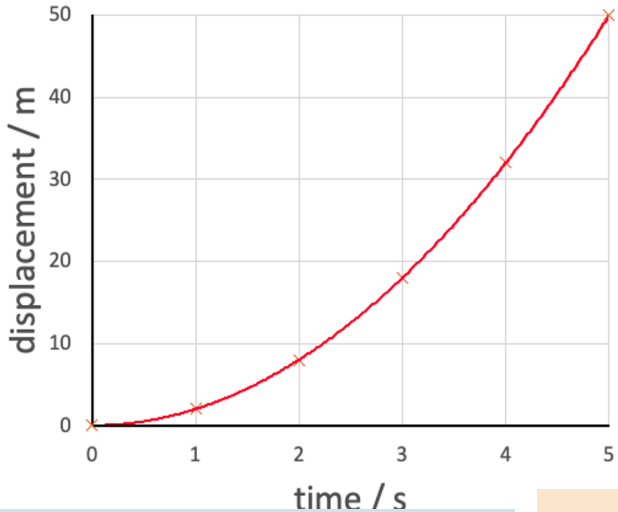
v-t graph shows the velocity is constant at -10 m/s. It is thus moving with constant speed towards the left.
Acceleration is zero. The car is not accelerating.

Group 4:

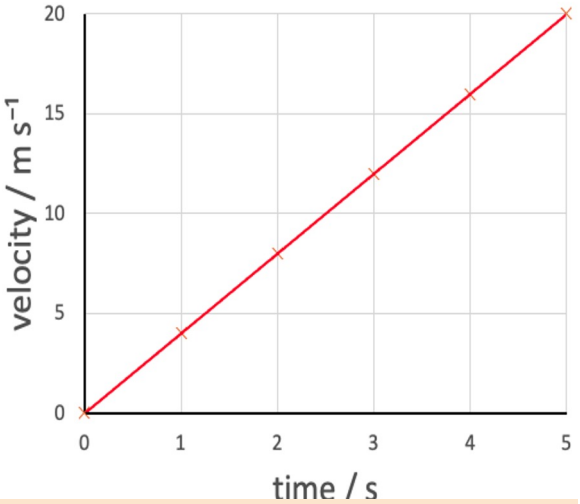


The car is moving to the right with increasing speed

time / s	displacement / m
0	0
1	2
2	8
3	18
4	32
5	50



time / s	velocity / m s^{-1}
0	0
1	4
2	8
3	12
4	16
5	20



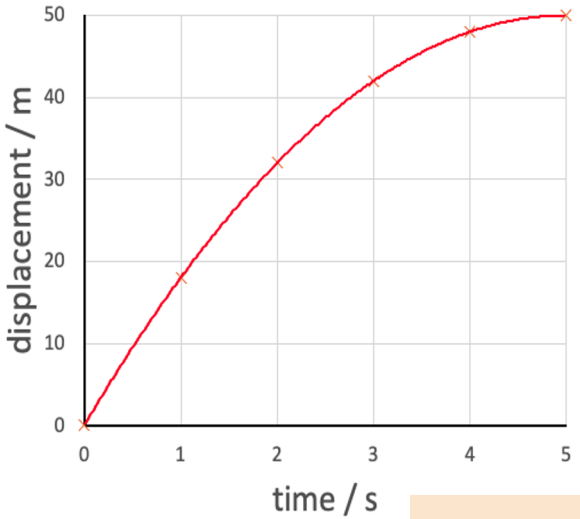
s-t graph has a positive gradient. This tells us that the velocity will be positive (moving to the right). The gradient is shallow at first and becomes steeper. This tells us that the speed is increasing.

The car starts from rest.
The gradient of the v-t graph is constant indicating a constant acceleration.
The gradient of the graph is positive (+4) indicating an acceleration of +4 m/s².

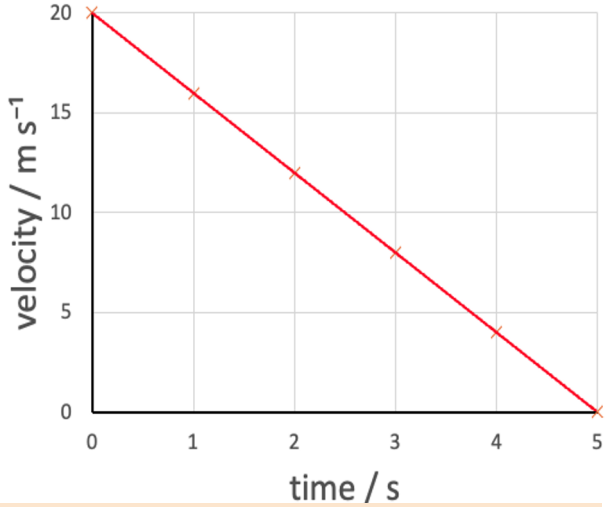
Group 5:

Car is moving to the right with decreasing speed.

time / s	displacement / m
0	0
1	18
2	32
3	42
4	48
5	50



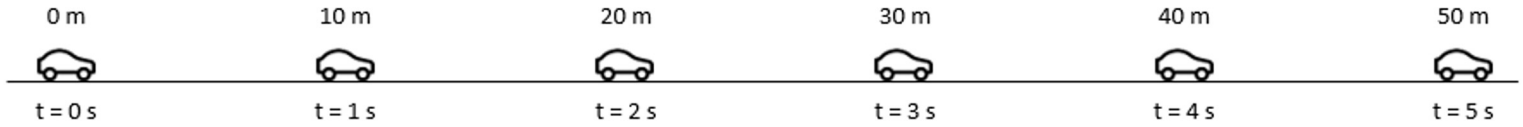
time / s	velocity / m s^{-1}
0	20
1	16
2	12
3	8
4	4
5	0



s-t graph has a positive gradient. This tells us that the velocity will be positive (moving to the right).
The gradient is steep at first and becomes shallower. This tells us that the speed is decreasing.

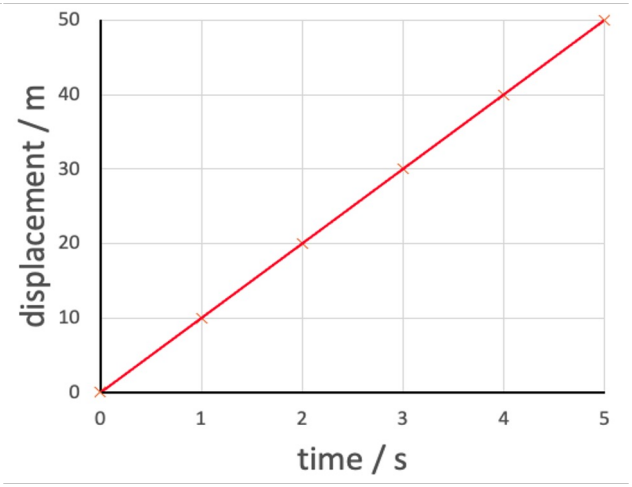
The gradient of the v-t graph is constant indicating a constant acceleration.
The gradient of the graph is negative (-4) indicating an acceleration of -4 m/s².
The speed of the car is decreasing.
As the car is slowing down we could refer to this as a deceleration of 4 m/s².

Group 6:

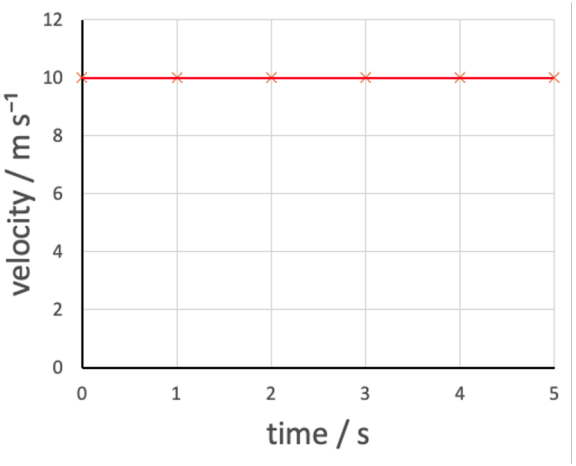


Car moves at a constant speed towards the right.

time / s	displacement / m
0	0
1	10
2	20
3	30
4	40
5	50



time / s	velocity / m s^{-1}
0	10
1	10
2	10
3	10
4	10
5	10



s-t graph has a positive gradient. This tells us the car is moving to the right.
The gradient is constant. This tells us that the velocity of the car is constant.
Gradient = +10. Meaning the velocity is +10 m/s.

v-t graph shows the velocity is fixed at +10 m/s.
It is thus moving with constant speed towards the right.
Acceleration is zero. The car is not accelerating.