

Name:

Exam Style Questions

## Kinematics: Formulae



Corbettmaths

Equipment needed: Pen, Calculator

### Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

Video Tutorial

[www.corbettmaths.com/contents](http://www.corbettmaths.com/contents)

Video 299a



Answers and Video Solutions



1. A car is travelling with a velocity of 10m/s



The car then accelerates at 4m/s<sup>2</sup> for 3 seconds.

Use the formula  $v = u + at$  to find the velocity of the car after 3 seconds.

$$\begin{aligned} u &= 10 & v &= 10 + 4(3) \\ a &= 4 & &= 10 + 12 \\ t &= 3 & &= 22 \end{aligned}$$

..... 22 m/s  
(2)

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2. A boy is cycling with a velocity of 2m/s



He then accelerates at 1.5m/s<sup>2</sup> for 10 seconds.

Use the formula  $v = u + at$  to find the final velocity.

$$\begin{aligned} u &= 2 & v &= u + at \\ a &= 1.5 & &= 2 + 1.5(10) \\ t &= 10 & &= 2 + 15 \\ & & &= 17 \end{aligned}$$

..... 17 m/s  
(2)

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3. A train starts from rest and accelerates at 0.2m/s<sup>2</sup> for one minute.



Use the formula  $v = u + at$  to calculate the velocity of the train after one minute.

$$u = 0 \quad a = 0.2 \quad t = 60$$

$$v = 0 + (0.2)60$$

$$v = 12$$

..... 12 m/s  
(2)

4. A kart accelerates at  $2\text{m/s}^2$  for 7 seconds.  
Its velocity after 7 seconds is  $20\text{m/s}$ .



Use the formula  $v = u + at$  to calculate the initial velocity of the kart.

$$v = 20$$

$$t = 7$$

$$a = 2$$

$$v = u + at$$

$$20 = u + 2(7)$$

$$20 = u + 14$$

$$u = 6$$

..... $6$ .....m/s  
(2)

5. Use the formula  $v = u + at$   
to find the acceleration, when:



the initial velocity is  $7\text{m/s}$   $u$

the time is 12 seconds  $t$

the final velocity is  $16\text{m/s}$   $v$

$$16 = 7 + a(12)$$

$$16 = 7 + 12a$$

$$9 = 12a$$

$$a = 0.75$$

..... $0.75$ .....m/s<sup>2</sup>  
(2)

6.  $v = u + at$



$$u = 6 \quad a = 2.4 \quad t = 20$$


Work out the value of  $v$

$$v = 6 + 2.4(20)$$

$$v = 6 + 48$$

$$v = 54$$

..... $54$ .....m/s  
(2)

7.  A ball is dropped from the top of a building and reaches the ground after 3 seconds.

Given  $s = 5t^2$

$s$  is the distance travelled by the ball in metres.

$t$  is the time taken in seconds.

Work out the height the ball was dropped from.

$$s = 5 \times 3^2$$

$$s = 5 \times 9$$

$$s = 45$$

45

.....m  
(2)

8. Use the formula  $v = u + at$



to find the time taken, when:

$u$  the initial velocity is 24m/s

$v$  the final velocity is 2m/s

$a$  the acceleration is  $-5\text{m/s}^2$

$$2 = 24 + (-5)t$$

$$2 = 24 - 5t$$

$$2 + 5t = 24$$

$$5t = 22$$

$$t = 4.4$$

4.4

.....seconds  
(2)

9.  $v = u + at$



$v = 8 \quad a = -7 \quad t = 2.5$

Work out the value of  $u$

$$8 = u + (-7)2.5$$

$$8 = u - 17.5$$

$$25.5 = u$$

$$25.5$$

.....m/s  
(2)

10.  $s = ut + \frac{1}{2}at^2$



$u = 0 \quad t = 4 \quad a = 5$

Work out the value of  $s$

$$s = 0(4) + \frac{1}{2}(5)(4)^2$$

$$s = 0 + \frac{1}{2}(5)(16)$$

$$s = 40$$

$$40$$

.....m  
(2)

11.  $v^2 = u^2 + 2as$



$u = 3 \quad a = 2 \quad s = 40$

Work out a value of  $v$

$$v^2 = 3^2 + 2 \times 2 \times 40$$

$$v^2 = 9 + 160$$

$$v^2 = 169$$

$$v = \pm 13$$

$$13 \text{ or } -13$$

.....m/s  
(2)

12.  $s = ut + \frac{1}{2}at^2$



$u = 8 \quad t = 3 \quad a = 10$

Work out the value of  $s$

$$s = 8(3) + \frac{1}{2}(10)(3)^2$$

$$s = 24 + 5(9)$$

$$s = 24 + 45$$

$$s = 69$$

.....m  
(2)

13.  $v^2 = u^2 + 2as$



$v = 20 \quad a = 7 \quad s = 26$

Work out a value of  $u$

$$20^2 = u^2 + 2(7)(26)$$

$$400 = u^2 + 364$$

$$u^2 = 36$$

$$u = \pm 6$$

.....m/s  
(2)

14. Make  $a$  the subject of  $v = u + at$



$$-u \quad -u$$

$$v - u = at$$

$$\div t \quad \div t$$

$$\frac{v-u}{t} = a$$

.....  
(2)