

1. The coefficient of friction is 0.4 and the normal reaction is 100 N. What is the maximum (limiting) friction force, in N?

2. A car starts from rest and accelerates at 2.5 m/s^2 for 4 s. Using $v = u + at$, what is its speed (m/s)?

3. A 2 kg body moving at 3 m/s hits a stationary 1 kg body and they stick together. What is their common speed (m/s)?

4. A resultant force gives a 5 kg mass an acceleration of 2 m/s^2 . What is the force ($F = ma$), in N?

5. What is the kinetic energy of a 2 kg object moving at 3 m/s ($KE = \frac{1}{2}mv^2$), in J?

6. A particle is in equilibrium when the forces on it:
 - ☐ are all equal in size
 - ☐ are all pointing up
 - ☐ are all friction
 - ☐ have a vector sum of zero
7. On a velocity–time graph, the area under the line gives the:
 - ☐ acceleration
 - ☐ force
 - ☐ displacement
 - ☐ mass
8. Momentum is defined as:
 - ☐ mass $\times$ velocity
 - ☐ force $\times$ distance
 - ☐ mass $\times$ acceleration
 - ☐ mass / velocity

9. To analyse motion on an inclined plane, you should:

- ☐ only use horizontal components
- ☐ ignore gravity
- ☐ resolve the forces along and perpendicular to the slope
- ☐ assume no acceleration

10. Doubling the speed of an object doubles its kinetic energy.

- ☐ True ☐ False

A-Level Mathematics

1. **40**

Maximum friction = $\mu R = 0.4 \times 100 = 40$ N.

2. **10**

$v = 0 + 2.5 \times 4 = 10$ m/s.

3. **2**

$2(3) + 1(0) = (2+1)v$, so $6 = 3v$, giving $v = 2$ m/s.

4. **10**

$F = ma = 5 \times 2 = 10$ N.

5. **9**

$KE = \frac{1}{2} \times 2 \times 3^2 = \frac{1}{2} \times 2 \times 9 = 9$ J.

6. **have a vector sum of zero**

Equilibrium means the forces balance – their vector sum is zero.

7. **displacement**

Area = displacement; the gradient gives the acceleration.

8. **mass $\times$ velocity**

Momentum = mass $\times$ velocity, a vector quantity.

9. **resolve the forces along and perpendicular to the slope**

Resolve along the slope (apply $F = ma$ there) and perpendicular to it (for the normal reaction).

10. **False**

$KE = \frac{1}{2}mv^2$, so doubling v quadruples KE ($2^2 = 4$ times).