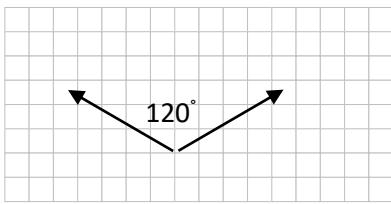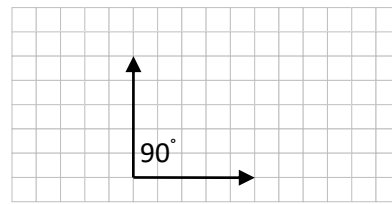**Quiz A2.1**

Forces and Newton's laws

1. Two forces have magnitudes 12 N and 8.0 N. Which is **not** a possible value of the magnitude of the resultant of the two forces?

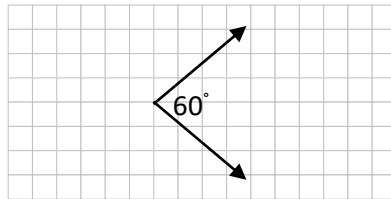   **A** 18 N   **B** 16 N   **C** 8.0 N   **D** 3.0 N

2. Each diagram shows a pair of forces. Each has magnitude F. In which case is the resultant force equal in magnitude to F?
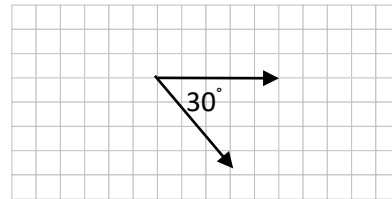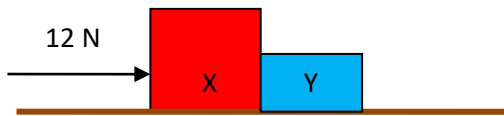

   A

   B

   C

   D

3. Two blocks X and Y of mass 4.0 kg and 2.0 kg respectively, are in contact on a frictionless horizontal surface. A horizontal force of 12 N acts on X.


   What is the net force on each block?

	Net force on X	Net force on Y
A	8.0 N	12 N
B	8.0 N	4.0 N
C	12 N	12 N
D	12 N	4.0 N

4. A block of mass 4.0 kg rests on a horizontal rough surface. A horizontal force of 12 N accelerates the block with acceleration 2.0 m s^{-2}. What will the acceleration be if a force of 24 N acts on the block?

A 3.0 m s^{-2} **B** 4.0 m s^{-2} **C** 5.0 m s^{-2} **D** 8.0 m s^{-2}

5. A balloon is filled with helium of density ρ_{He}. The density of air is ρ_a. The balloon is tied to the ground with a vertical string. The mass of the balloon is negligible compared to the mass of helium it contains.
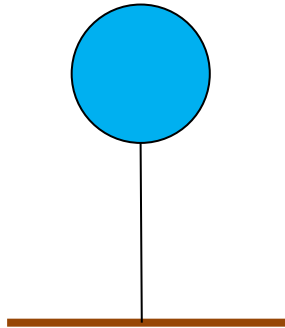

The string is cut. What is the initial acceleration of the balloon?

A $\dfrac{\rho_a - \rho_{He}}{\rho_{He}} g$ **B** $\dfrac{\rho_a + \rho_{He}}{\rho_{He}} g$ **C** $\dfrac{\rho_a - \rho_{He}}{\rho_a} g$ **D** $\dfrac{\rho_a + \rho_{He}}{\rho_a} g$

6. A boy of mass 45 kg stands on the floor of an elevator. The elevator is accelerating upwards with acceleration 2.0 m s^{-2}. What is the force the boy exerts on the elevator floor?

A 90 N **B** 360 N **C** 450 N **D** 540 N

7. The dynamic coefficient of friction between two blocks is 0.40 and the static coefficient is 0.60. The two blocks are on top of each other on a frictionless horizontal surface. A horizontal force F acts on the lower body. The lower block has mass 4.0 kg and the upper block a mass 2.0 kg.
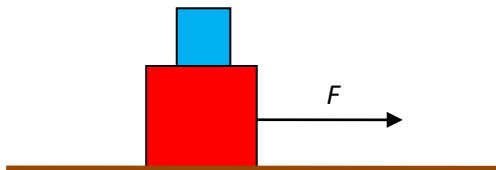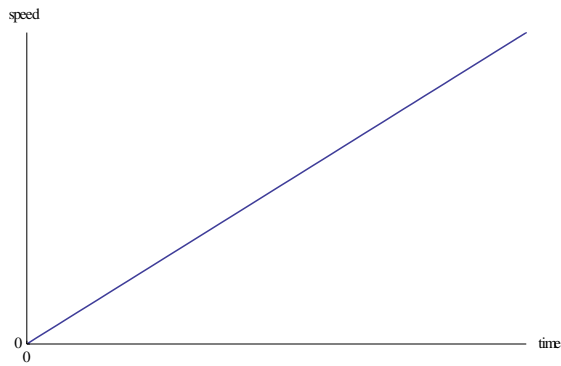

What is the maximum force F so that both blocks move together without sliding on each other?

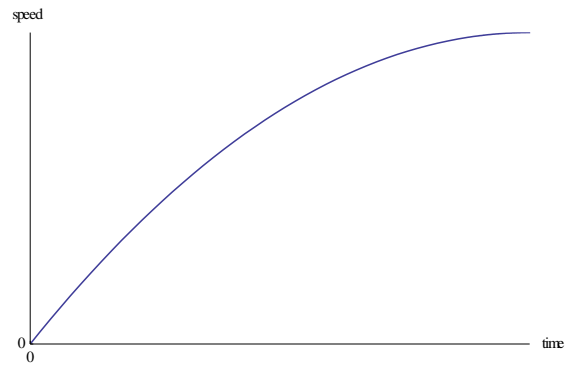**A** 36 N **B** 28 N **C** 12 N **D** 8.0 N

8. The graph shows the variation with time of the net force acting on a body.
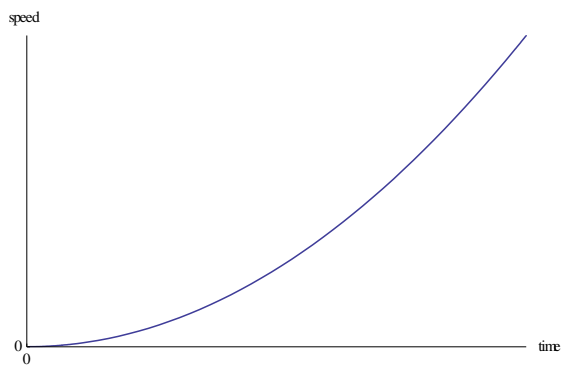
Force
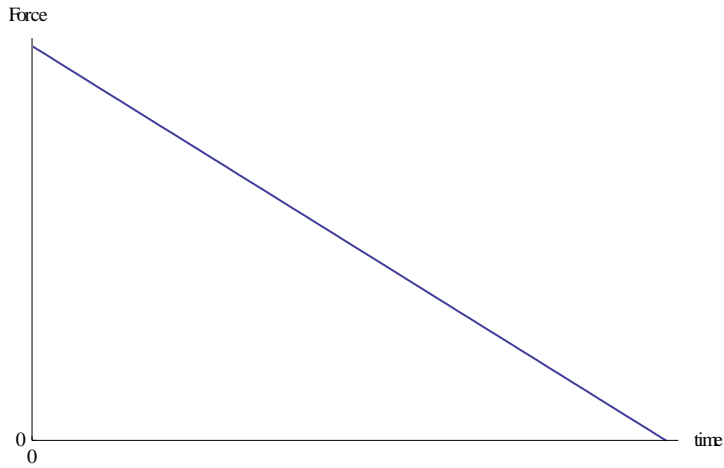
The body is initially at rest. Which graph shows the variation with time of the speed of the body?
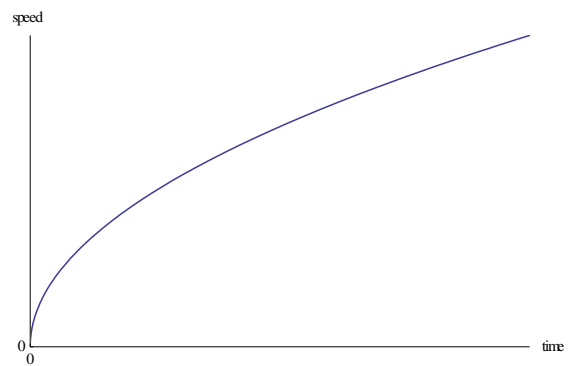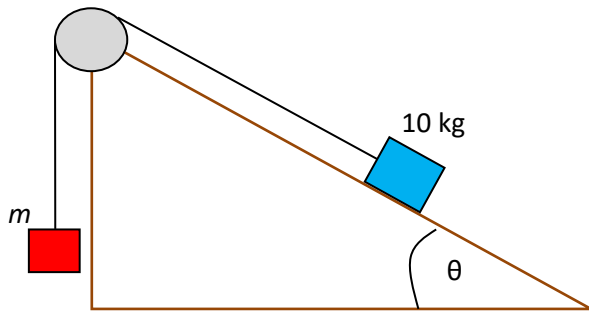

A

B

C

D

9. A block of mass 10 kg is at rest on a rough inclined plane. It is joined with a string with another block of mass m that hangs vertically. The angle θ is such that $\sin\theta = \dfrac{3}{5}$ and $\cos\theta = \dfrac{4}{5}$.

The static coefficient of friction is 0.5. What is the largest value of m such that the system is in equilibrium?

A 1.0 kg **B** 2.0 kg **C** 5.0 kg **D** 10 kg

10. Two identical springs each of spring constant 200 N m⁻¹ are attached to each other as shown. A block of mass 2.0 kg hangs vertically at the end of the lower spring.

What is the extension in each spring?

	Lower	Upper
A	0.1 m	0.1 m
B	0.1 m	0.2 m
C	0.2 m	0.1 m
D	0.2 m	0.2 m

Quiz A2.1 Answers	
1	D
2	A
3	B
4	C
5	A
6	D
7	A
8	B
9	D
10	A