Momentum Practice

1 Fill in the blanks in these sentences.
Use the words **N**, **momentum**, **velocity**, **resultant force**, **second**, **multiply**.
_____ measures how hard it is to start or stop something moving.
If a trolley has 100 kg m/s of momentum, then it will need a 100 _____ _____
to stop it in one _____.
To calculate the momentum, you _____ the mass by the _____.

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2 Calculate the momentum of a 0.15 kg tennis ball served at 40 m/s.

momentum (kg m/s)	=	mass (kg)	×	velocity (m/s)
	=	0.15	×	40

3 Calculate the momentum of a 150 000 kg whale swimming at 6 m/s.

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4 Calculate the momentum of

(a) a 75 kg jogger running at 2.5 m/s,

(b) a 25 kg child running at 2.5 m/s,

(c) a 75 kg cyclist riding at 7.0 m/s.

5 Look at your answers to question 4 and complete these sentences.
Use the words **mass**, **velocity**, **harder**, **easier**, **higher** and **lower**.

(a) The cyclist is _____ to stop than the jogger because they have a _____ _____.

(b) The child is _____ to stop than the jogger because they have a _____ _____.

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6 For each pair, work out which one is harder to stop in terms of force.

(a) A 250 kg tiger running at 20 m/s or an 3000 kg elephant walking at 0.6 m/s.

(b) A 3000 kg jet at 500 m/s or a 20 000 000 kg ship at 11 m/s.

(c) A 300 kg horse at 15 m/s or a 90 kg ski jumper at 25 m/s.

7 A loaded supermarket trolley requires a 45 N force to stop it in one second.

(a) Write down the momentum of the trolley when it was moving.

(b) The mass is 15 kg. Work out the velocity of the trolley using an equation

momentum (kg m/s)	=	mass (kg)	×	velocity (m/s)
45	=	15	×	

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8 A rising fish has 18 kg m/s of momentum.

(a) If its mass is 12 kg, how fast is it going?

(b) How much resultant force was needed to start the motion in one second?

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9 A loaded supermarket trolley requires a 60 N force to stop it in one second.

(a) Write down the momentum of the trolley when it was moving.

(b) The velocity was 0.8 m/s. Work out the mass of the trolley using an equation

momentum (kg m/s)	=	mass (kg)	×	velocity (m/s)
60	=		×	0.8

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10 Complete the word equations using **momentum**, **mass** and **velocity**.

(a) momentum= (b) velocity = (c) mass =

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11 Complete the equation for working out the force needed to stop a moving object.

force = ÷

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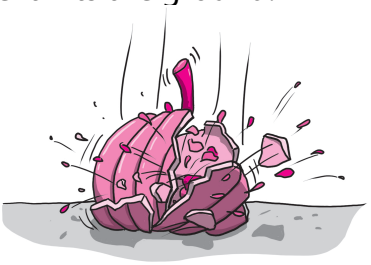
12 A 75 kg passenger is riding in a tram at 6 m/s.

(a) How much force is needed to stop them in one second?

(b) How much force would be needed to stop them in two seconds?

13 A falling pumpkin has 3000 kg m/s of momentum just before it hits the ground.

(a) If the velocity is 15 m/s, what is its mass?



(b) How much resultant force is needed to stop it in one second?

(c) Is the force from the ground stopping it in 1 s the same as your answer to (b)?

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14 A 2600 kg loaded van is going at 30 m/s.

(a) Calculate its momentum.

(b) How much force would the brakes need to stop it in 20 s?

(c) How much force would the brakes need to stop it in 10 s?

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15 An 800 kg race car needs to accelerate from rest to 125 m/s in 6.0 s.

(a) Calculate the momentum it will have at 125 m/s.

(b) Calculate the force needed from the engine to accelerate it to 125 m/s in 6.0 s. Assume that there are no resisting forces.

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16 A rubber band provides a 3 N force for 0.12 s to a 0.004 kg cardboard dart.

(a) How much momentum will the band give the dart?

(b) How fast will the dart be after it has been launched? Assume that there are no other forces.

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17 How much time does it take to stop a $40\,000\,000$ kg tanker ship at 8.5 m/s with a $4\,000\,000$ N resultant force?