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Part A: Multiple Choice (10 marks):
(1) A missile travelling at $375 \mathrm{~m} / \mathrm{s}$ [E] is approaching a plane travelling at $350 \mathrm{~m} / \mathrm{s}$ [E]. What is the velocity of the missile with respect to the plane?
(a) $25 \mathrm{~m} / \mathrm{s}$ [W]
(b) $25 \mathrm{~m} / \mathrm{s}$ [E]
(c) $375 \mathrm{~m} / \mathrm{s}$ [E]
(d) $725 \mathrm{~m} / \mathrm{s}$ [E]
(2) Nick is running away from Sam at $5.0 \mathrm{~m} / \mathrm{s}$. If Sam runs at $8.0 \mathrm{~m} / \mathrm{s}$, and Nick has a 300 m head start, how long will it take Sam to catch him?
a. 100 s
b. 60 s
c. 37.5 s
d. 23 s
(3) Car A is moving north at $35 \mathrm{~km} / \mathrm{h}$ while Car B is moving south at $50 \mathrm{~km} / \mathrm{h}$. What is the velocity of Car A with respect to Car B?
a. $15 \mathrm{~km} / \mathrm{h}$ north
b. $15 \mathrm{~km} / \mathrm{h}$ south
c. $85 \mathrm{~km} / \mathrm{h}$ north
d. $85 \mathrm{~km} / \mathrm{h}$ south
(4) A rocket accelerates from $130 \mathrm{~m} / \mathrm{s}$ to $70 \mathrm{~m} / \mathrm{s}$ in 5.0 s . What was it's acceleration?
a. $-40 \mathrm{~m} / \mathrm{s}^{2}$
b. $-12 \mathrm{~m} / \mathrm{s}^{2}$
c. $12 \mathrm{~m} / \mathrm{s}^{2}$
d. $40 \mathrm{~m} / \mathrm{s}^{2}$
(5) An arrow is shot straight up at $50.0 \mathrm{~m} / \mathrm{s}$. Approximately how fast is it travelling after 2.0s?
(a) $25 \mathrm{~m} / \mathrm{s}$
(b) $30 \mathrm{~m} / \mathrm{s}$
(c) $47 \mathrm{~m} / \mathrm{s}$
(d) $70 \mathrm{~m} / \mathrm{s}$
(6) A bomb is dropped from an airplane at an altitude of 6000 m . How far has the bomb fallen after 3.0s?
(a) 15 m
(b) 30 m
(c) 45 m
(d) 2000 m
(7) How long will it take an airplane with an airspeed of $200 \mathrm{~km} / \mathrm{h}$ to travel 200 km if there is a $50 \mathrm{~km} / \mathrm{h}$ tailwind?
(a) 0.75 hr
(b) 0.80 hr
(c) 1.0 hr
(d) 1.33 hr
(8) A snail crawls 8 cm right on a leaf. At the same time, the wind blows the leaf 10 cm left. What is the displacement of the leaf with respect to the snail?
(a) 2 cm left
(b) 8 cm left
(c) 8 cm right
(d) 18 cm right

Name: $\qquad$
(9) An object is thrown vertically upwards from the Earth. While it is rising what is true about its velocity and acceleration?
(a) Its velocity is downward and its acceleration is downward
(b) Its velocity is upward and its acceleration is upward
(c) Its velocity is downward and its acceleration is upward
(d) Its velocity is upward and its acceleration is downward
(10) What is the acceleration of the following object at $\mathrm{t}=7 \mathrm{~s}$ ?

(a) $0.7 \mathrm{~m} / \mathrm{s}^{2} \mathrm{~N}$
(b) $0.7 \mathrm{~m} / \mathrm{s}^{2} \mathrm{~S}$
(c) $2 \mathrm{~m} / \mathrm{s}^{2} \mathrm{~N}$
(d) $2 \mathrm{~m} / \mathrm{s}^{2} \mathrm{~S}$

Part B: Short Answer (15 marks)
(1) A car travelling at $25.0 \mathrm{~m} / \mathrm{s}$ slams on the brakes and stops in 65.2 m . What is the car's acceleration? (3)
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(2) A ball is thrown upwards from a 45 m high bridge at $17.8 \mathrm{~m} / \mathrm{s}$. What is the maximum height the ball reaches off the ground? (3)
(3) A falling object reaches a speed of $32.5 \mathrm{~m} / \mathrm{s}$ in 3.4 s . How far did it fall in this time? (2)
(4) A boat is sailing west at $60 \mathrm{~km} / \mathrm{h}$ when there is a current of $25 \mathrm{~km} / \mathrm{h}[\mathrm{S}]$. What is the boat's velocity with respect to the shore? Include a diagram with your answer (3)
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(4) a. A plane has an airspeed of $350 \mathrm{~km} / \mathrm{h}$. If it wants to travel due north and there is a $80 \mathrm{~km} / \mathrm{h}$ [E] wind blowing, in what direction must the plane fly? Include a diagram in your answer. (2)
b. How long will it take the plane to fly $650 \mathrm{~km}[\mathrm{~N}]$ ? (2)

