

PRIFYSGOL CYMRU

Y Drindod Dewi Sant

UNIVERSITY OF WALES

Trinity Saint David

Examination Answer Book

24 Pages

Instructions to candidates

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right and seal to hide your name.
3. The answers must be **legibly** written. The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
6. No part of this book is to be torn out; it must be handed in complete.
7. If more books than one are used, fasten them together using the tags available from the invigilator(s).
8. **Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.**

1	Student Number	P144277
2	Title of Examination Paper	Munitions
3	Module Code	MBX00944
4	Date and Time of Examination	
5	Examination Venue	
6	Seat Number	

7	Number of Answer Books handed in	
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[illegible]

Please complete this section and SEAL before the examination starts.

Surname McIntyre (Block Capitals) Forename(s) Lewis Fergusson

FOLD

Complete
section,
remove
strip, fold as
indicated
and SEAL

PATENT PENDING
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PATENT PENDING

$$V_0 \approx \sqrt{2E} \left(\frac{m}{c} + \frac{1}{2} \right)^{-\frac{1}{2}}$$

$$\sqrt{2E} = \frac{V_0 D}{2.97}$$

$$V_0 \approx \sqrt{V_0^2 + V_m^2}$$

$$\theta = \sin^{-1} \left(\frac{V_0 \cos \alpha}{2D} \right)$$

Question 1

a) Passive - Seeks its own target by identifying RF & Heat sources ✓

Semi-Active - Another source identifies the target using RF or lasers which then tells the missile where to go ✓

Active - The missile specifies its own target by the use of Radar, lasers, RF, heat then will decide by software if the target is viable ✓ 3.5

b) Passive missiles are cheaper to manufacture providing a cheaper system to be used in operation against a slow moving or stationary target. ✓ 0.5

c)

x

Question 2



The Shaped Charge is initiated by the detonation within the warhead. This the propagates a wave throughout the warhead which due to the inward design^{*} creates the formation of a jet^{*} as the wave pressure increases. Then when the wave impacts the target it punches a hole as you would expect a common drill to produce, this cut is much the same as water jet.

2.5

- b) • the stand off distance from the shaped charge to the target
• the angle of shaped charge formation (labelled above as θ)

1

c)

x

Question 3

- a) delay - the delay fuse has a specified time limit before initiation after the mortar impacts the target ✓

Proximity - the proximity fuse will initiate the mortar at a ~~the~~ specified distance from the target ✓ (3.5)

Impact - the fuse will be initiated upon impact with the target ✓

- b) High Ex - high explosive mortar rounds will have a green casing with a golden yellow band towards the nose of the mortar (1)

Illum - Illumination mortars will have a green casing with a white band towards the nose of the mortar

dynamic stability is achieved through the centre of pressure being positioned behind the centre of gravity which allows the

Mortar to maintain stability throughout its flight

1.5

Question 4

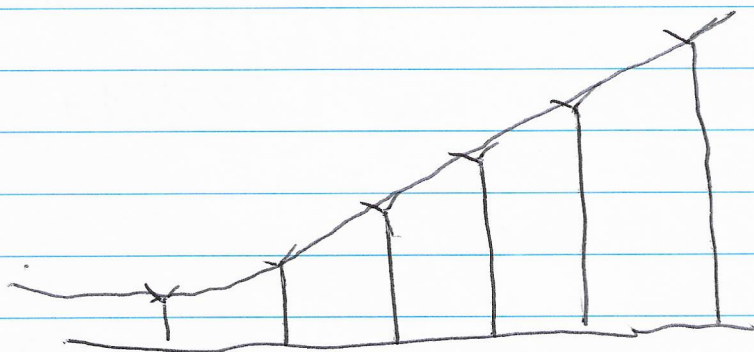
a) Primary - Primary blast effects are when the ~~blast~~ blast pressure impacts the body and causes internal organs to deform.

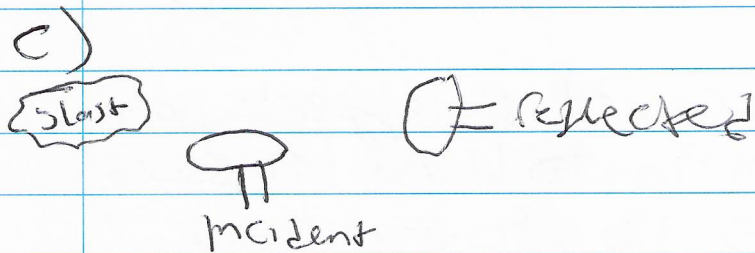
Secondary - Secondary blast effects are when frag from the casing and frag from the ground are thrown causing damage

tertiary - tertiary blast effects are when the blast wave carries enough power to throw objects from one place to another. E.G. a person being thrown against a wall

3

b)





The reflected wave receives a much greater peak pressure from the blast.

The incident wave receives both waves the tensile and pressure, the tensile wave is considered to be stronger. This is therefore why there is a difference in pressures.

Question 5

$$a) V_0 = \sqrt{2E} \left(\frac{m}{c} + \frac{1}{2} \right)^{-\frac{1}{2}}$$

$$V_0 = 2841.75 \left(\frac{6}{4.5} + \frac{1}{2} \right)^{-\frac{1}{2}}$$

$$m = 6$$

$$c = 4.5$$

$$VOD = 8440 \text{ RDX}$$

$$9110 \text{ HMX}$$

$$\sqrt{2E} = \frac{VOD}{2.97}$$

$$= \frac{8440}{2.97}$$

$$= \frac{9110}{2.97}$$

$$\text{RDX} = 2841.75 \quad \text{HMX} = 3067.34$$

$$V_0 = 2841.75 \left(\frac{6}{4.5} + \frac{1}{2} \right)^{-\frac{1}{2}}$$

1.5

$$i) \text{RDX} - V_0 = 2098.77$$

1.5

$$ii) \text{HMX} - V_0 = 3067.34 \left(\frac{6}{4.5} + \frac{1}{2} \right)^{-\frac{1}{2}}$$

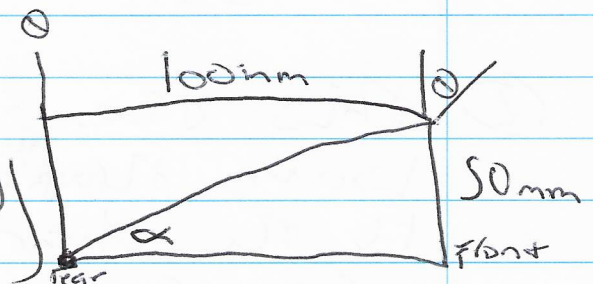
$$V_0 = 2265.38$$

$$b) \theta = \sin^{-1} \left(\frac{V_0 \times \cos \alpha}{2D} \right)$$

$$\text{front} \quad \theta = \sin^{-1} \left(\frac{2098.77 \times (\cos 26.56)}{100 \times 2} \right)$$

$$\theta = \sin^{-1} (9.39)$$

$$\theta = \text{ERROR!}$$



$$\tan = \frac{50}{100}$$

$$\tan = 0.5$$

$$\alpha = 26.56^\circ$$

2.5

$$\text{Rear} \quad \theta = 0$$

$$c) V_d = \sqrt{(V_o^2 + V_n^2)}$$

$$V_d = \sqrt{(2098.77^2 + 420^2)}$$

$$V_d = \sqrt{4580983.664}$$

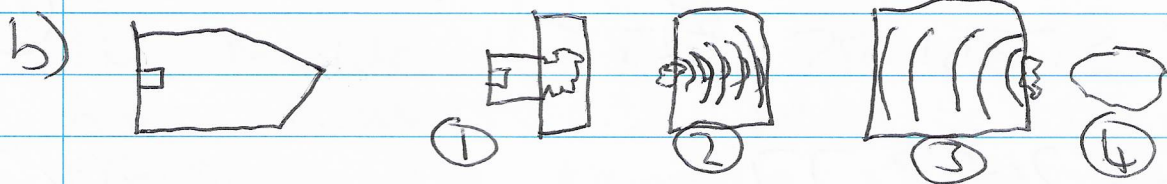
$$V_d = 2140.32 \text{ m/s}$$

0.5

Question 6

a) the nose-rod is malleable therefore it 'splats' on impact with the armour

0.5



① the ammunition impacts the armour and due to the malleable nose cone it 'splats' against the armour

② this then sends a pressure wave through the armour but ~~due to~~ due to the characteristics of rolled armour the IS has little effect

③ the tensile wave that it puts the armour has major effect due to the armour's dense characteristics and this then cause a large frag to be created from the armour as

0.5

It disconnects from its original position as part of the armour

(4) the frag created ten bounces around giving the desired effect as intended

~~65~~

65

