

UNIT PEPERIKSAAN
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MELAKA

FORMATIVE TEST 1, 2012

PHYSICS 4531

FORM 5

Time : 1 hour

Name:

Class:

PLEASE DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO
INFORMATION FOR CANDIDATES

- 1 Answer all questions.
- 2 For Section A write the letter, A, B, C or D in the table provided at the end of the section.
- 3 For Section B, write your answer in the space provided in the question paper .
- 4 The diagrams in the questions provided are not drawn to scale unless stated.
- 5 You may use a non-programmable scientific calculator.

SECTION A

1 Which of the following describes the direction of vibration of the molecules of a longitudinal wave to its direction of propagation?

- A At 30° B At 60° C At 90° D parallel

2 Figure 1 shows the wave pattern produced by a spherical dipper at a frequency of 20 Hz in a ripple tank.

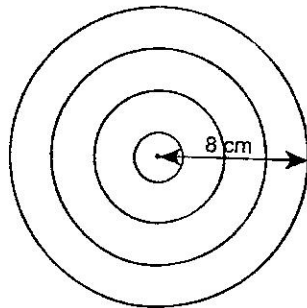


Figure 1

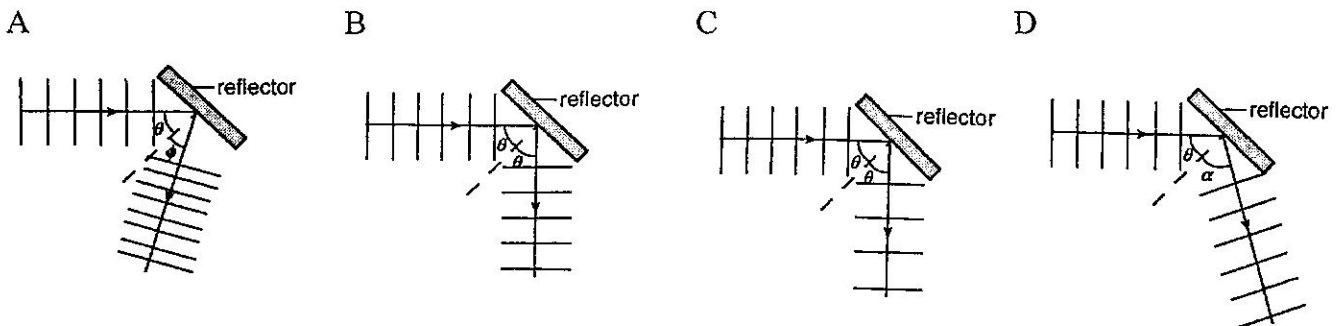
What is the speed of the wave?

- A 20 cms^{-1} B 40 cms^{-1} C 100 cms^{-1} D 160 cms^{-1}

3 A system which is oscillating at its natural frequency with maximum amplitude due to an external force is experiencing

- A resonance B damping C diffraction D constructive interference

4 Which of the following diagrams shows the correct pattern of reflected water wave?



5 Figure 2 shows a ripple tank with an inclined base. Plane waves are produced by a straight vibrator.

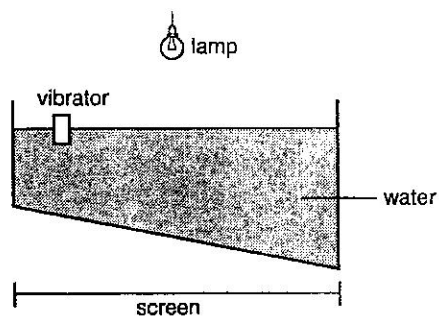


Figure 2

Which of the following pattern can be seen on the screen?

A



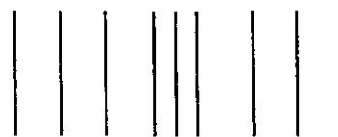
B



C



D



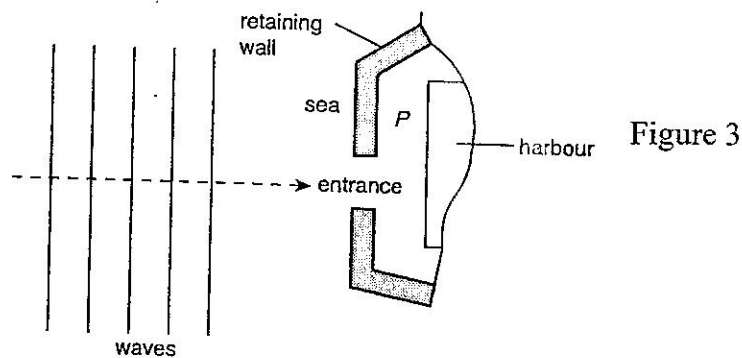
6 Which of the following is true about the refraction of sound?

- A The sound of a distant source is louder during the day than at night.
- B The sound of a distant sound at night is louder as compared to during the day.
- C Echoes can be heard when sound is refracted.
- D Frequency of the sound is changed when refraction occur.

7 Which of the following quantities changes when a wave is diffracted?

- A Speed
- B Wavelength
- C Direction of propagation
- D Frequency

- 8 Figure 3 shows water waves moving towards a harbour.



Which phenomenon explains the propagation of waves at P?

- A Reflection B Diffraction C Refraction D Interference

- 9 The position where constructive interference occurs is known as

- A a node B an antinode C a crest D a maximum

10 In a Young's double slit experiment, red fringes are formed on the screen when a red light source is used. What change will be observed if the red light source is replaced by a blue light source?

- A Blue fringes are formed on the screen and the separation of the fringes is smaller than that of red light.
B Blue fringes are formed on the screen and the separation of the fringes is greater than that of red light.
C Blue fringes are formed on the screen and the separation of the fringes is the same as that of red light.
D No fringes can be observed on the screen.

11 Johan shouts in front of a wall and he hears the echo of his voice 0.8 s later. What is the distance of the wall from Johan if the speed of sound in air is 300 ms^{-1} ?

- A 60 m B 120 m C 180 m D 240 m

12 Which of the following is used to detect counterfeit notes?

- A γ -ray B X-ray C ultraviolet light D infrared light

13 Which of the following does not need a medium for propagation?

- A Sound wave B Ultrasonic wave C supersonic wave D radio wave

14 Which of the following correctly represents the factors that affect the loudness and pitch of a sound?

	Pitch	Loudness
A	Amplitude	Frequency
B	Amplitude	Wavelength
C	Wavelength	Amplitude
D	Frequency	Amplitude

15 Which of the following is not an application of infrared ray?

- A Night vision camera
B TV remote control
C Data transmission through optical fibre network
D Sterilisation of medical equipment.

16

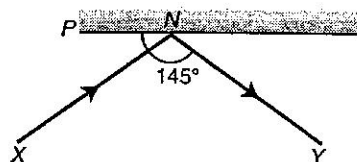


Figure 4

Figure 4 shows a light ray reflected by a plane mirror. Given $\angle PNY$ is 145° . What is the angle of incidence?

- A 25° B 35° C 55° D 72.5°

17 A diver is able to see a fish which is behind a large rock in front of him. This situation is an example of the phenomenon called

- A total internal reflection B dispersion C scattering D diffraction

18

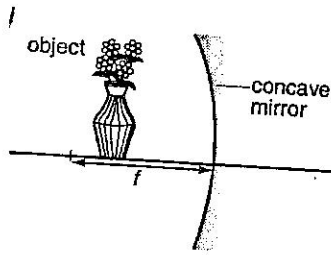


Figure 5

Figure 5 shows a vase placed at a distance less than the focal length of a concave mirror. What are the characteristics of the image?

- A Real, inverted, diminished.
- B Real, inverted, magnified.
- C Virtual, upright, magnified.
- D Virtual, upright, diminished.

19

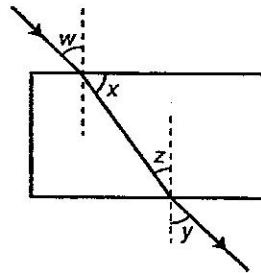


Figure 6

Figure 6 shows a path of ray of light passing through a rectangular glass block. The refractive index of the glass is

- A $\frac{\sin x}{\sin y}$
- B $\frac{\sin w}{\sin x}$
- C $\frac{\sin z}{\sin y}$
- D $\frac{\sin x}{\sin z}$

20 The focal length of a concave lens is 20 cm. What is the power of the lens?

- A + 5D
- B - 5D
- C + 20D
- D - 20D

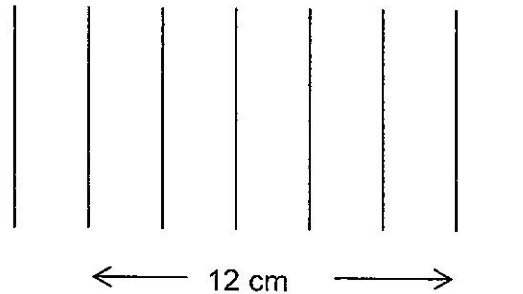
Answers to Section A

1		6		11		16	
2		7		12		17	
3		8		13		18	
4		9		14		19	
5		10		15		20	

SECTION B

1

(a) The diagram below shows the wavefronts produced by a ripple tank.



The frequency of the source is 25 Hz.

(i) Determine the wavelength of the wave. [2 marks]

(ii) Calculate the speed of the wave in the water. [3 marks]

(b) The water wave in (a) is passed through an opening formed by two straight obstacles.

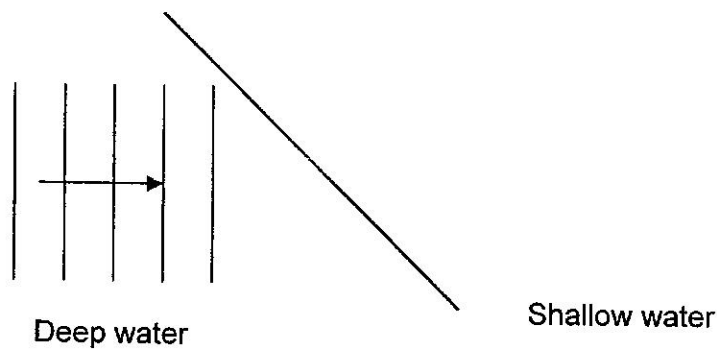
(i) Name the phenomenon that occurs when the wave passes through an opening. [1 mark]

(ii) Draw the pattern of the wavefronts to show the phenomenon you named above
(ii a) if the width of the opening is 3.0 cm; [3 marks]

(ii b) if the width of the opening is 30 cm.

[2 marks]

(c) The diagram below shows a water wave travels from deep water to shallow water.



(i) Name the wave phenomenon that occurs.

[1 mark]

(ii) Show, by drawing on the diagram above, the pattern of the wavefronts in the shallow water.

[3 marks]

2 Two coherent sources, S_1 and S_2 , which produce circular wavefronts are separated at a distance of 10 cm. The waves produced have a wavelength of 2 cm. Point P is 30 cm from S_1 and 35 cm from S_2 . Point Q is 40 cm from S_1 and 48 cm from S_2 .

(i) What is the path difference of P and Q, in terms of the wavelength, λ , from the two sources?

[3 marks]

P	Q
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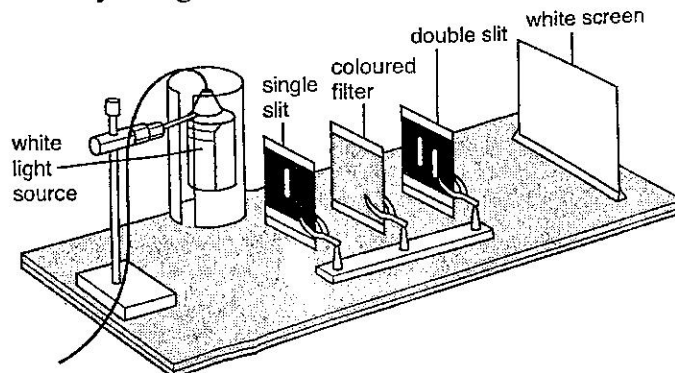
(ii) State the phenomena that occur at P and Q

[2 marks]

P :

Q :

(b) The figure below shows the arrangement of the apparatus in Young's double slit experiment. A green filter is used to produce monochromatic green light. The experiment is repeated by using a red filter.



(i) Draw the patterns seen on the screen for green light and red light. [3 marks]

Green light
Red light

(ii) The separation between the two slits on the double slit is 0.20 mm and the distance of the screen from the double slit is 1.0 m. When red filter is used, the separation between two consecutive bright fringes is 4.0 mm. Calculate the wavelength of the red light. [3 marks]