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業 偽 ♥ 学 HWA CHONG INSTITUTION END-OF-YEAR EXAMINATION 2014

PHYSICS Paper 1

Level:Secondary ThreeDuration:45 min

Do not open this booklet until you are told to do so.

INSTRUCTIONS TO CANDIDATES

Write your name, class and index number in the spaces provided and shade accordingly on the OMR sheet.

There are **thirty** questions in this paper. Answer **all** questions. For each question there are four possible answers, **A**, **B**, **C** and **D**. Choose the one you consider correct and record your choice in soft pencil on the answer sheet.

Read very carefully the instructions on the answer sheet.

INFORMATION FOR CANDIDATES

Each correct answer will score one mark. A mark will not be deducted for a wrong answer. Take g to be 10 m s^{-2} or 10 N kg^{-1} unless otherwise stated.

1. The diagram below shows the observed reading of a micrometer screw gauge. If the mircrometer is found to have a zero error of +0.03 mm, what is the corrected reading?



- A 2.20 mm
- **B** 2.23 mm
- **C** 2.70 mm
- **D** 2.76 mm
- 2. Which of the following correctly lists one scalar and one vector quantity?

	Scalar quantity	Vector quantity
A	Displacement	Work
B	Energy	Force
С	Force	Acceleration
D	Velocity	Weight

3. Fig 3.1 shows a right-angled prism being used to deflect a ray of light entering normally into the prism. Which ray in Fig 3.2 correctly shows the emergent ray for the same incident ray if the material used for the prism is replaced by one having a smaller refractive index?



4. A converging lens of focal length 15 cm produces an image 30 cm from the lens. How far is the object placed from the lens?

Α	10 cm	В	15 cm
С	30 cm	D	45 cm

5. The figure below shows four rays which have passed through a lens. Three rays came from point **Y**, but one ray came from point **X**. which ray came from point **X**.



- 6. Converging lens B has the same focal length as converging lens A, but only half the diameter. Both lenses are used, separately, to form two images of a tree on a screen. Which one of the following statement about the images is correct?
 - A The images are both real and inverted.
 - **B** The images are of the same brightness.
 - **C** Image B is bigger than the image A.
 - **D** Image B is not as sharply focused as image A.
- 7. The diagram below shows the position of a string at a particular instant of time as a transverse wave travels along it from left to right.



Which one of the following correctly shows the direction of the velocities of the points 1, 2 and 3 on the string?

	<u>1</u>	2	<u>3</u>
A	\downarrow	\downarrow	\downarrow
В	\downarrow	\uparrow	\downarrow
С	\uparrow	\downarrow	\uparrow
D	\rightarrow	\rightarrow	\rightarrow

8. X and Y are different wave motions. In air, X travels much faster than Y but has a shorter wavelength. Which types of wave motion could X and Y be?

	<u>X</u>	<u>Y</u>
A	Sound	Ultraviolet
B	Ultraviolet	Radio
С	Yellow light	Sound
D	Radio	Infrared

9. Which of the following is an application of microwaves in everyday life?

Α	endoscopy	В	radiography
С	photography	D	telecommunication

10. Radio waves, visible light and X rays are all part of the electromagnetic spectrum. What is the correct order of increasing wavelength?

	shortest —		→ longest
A	radio waves	visible light	X rays
B	radio waves	X rays	visible light
С	X rays	radio waves	visible light
D	X rays	visible light	radio waves

- 11. Which is **true** when ice changes to water at $0 \, {}^{\circ}\mathrm{C}$?
 - **A** Work is done in weakening the intermolecular forces.
 - **B** The specific latent heat increases.
 - **C** The ice molecules vibrate faster.
 - **D** Thermal energy is released to the surroundings.
- 12. A piece of iron of mass *m* and specific heat capacity *c*, and a piece of aluminium of mass 2*m* and specific heat capacity 2*c*, each received the same quantity of heat. The temperature of the aluminium rose by 8 K. By how much did the temperature of the iron rise?

Α	4 K	В	8 K
С	16 K	D	32 K

13. A solid is heated from a temperature below its melting point to a temperature above its melting point. Which graph correctly shows the relationship between the average kinetic energy of the molecules and the amount of thermal energy supplied?



- 14. A space shuttle is covered by "heat shields" over its body so as to protect the interior from getting too hot while entering the atmosphere of the Earth. Which of the following thermal properties is/are desirable for the material of the "heat shields"?
 - I It should be a good conductor of thermal energy.
 - II It should have a very high melting point.
 - III It should have high specific heat capacity.
 - AI onlyBIII onlyCI and II onlyDII and III only
- 15. Steam burns are more damaging than burns caused by boiling water because steam
 - **A** has a higher temperature than boiling water.
 - **B** has more energy per kilogram than boiling water.
 - **C** has a higher specific heat capacity than water.
 - **D** is a vapour of water molecules.

16. A vapour in a container is at a high temperature and loses thermal energy to its surroundings. The graph shows how its temperature changes over the next few minutes.



Which feature of the graph indicates that the specific latent heat of vaporisation of the substance is greater than its specific latent heat of fusion?

- **A** The gradient of the graph at P is greater than the gradient at R.
- **B** The gradient of the graph at T is greater than the gradient at R.
- **C** The length of the line Q is greater than the length of the line S.
- **D** The value of X is greater than the value of Y.
- 17. How can the sensitivity of a liquid-in-glass thermometer be increased?
 - **A** Use a thinner-walled bulb
 - **B** Use a tube with a narrower bore
 - **C** Use a longer tube
 - **D** Use a liquid that is a better thermal conductor
- 18. A plastic ruler feels warmer than a metal ruler because
 - **A** the metal ruler conducts thermal energy away from your hand faster.
 - **B** the molecules in the metal ruler are less energetic.
 - C the metal ruler has a shinier surface.
 - **D** the metal ruler is a worse radiator of thermal energy.
- 19. Which method will **not** produce convection currents in a container filled with water at $30 \,^{\circ}$ C?
 - A Placing a lighted bulb just above the water surface
 - **B** Dropping a piece of hot metal into the water
 - **C** Lighting a candle beneath the container
 - **D** Floating a piece of ice on the water

20. On a hot day, a drink in a bottle can be kept cool by standing it in a bowl of water and placing a wet cloth over it. How is the drink kept cool?



- A Hot air cannot get into the bottle.
- **B** The cloth conducts heat from the bottle into the water.
- **C** The drink cannot evaporate from the bottle.
- **D** Water evaporating from the cloth cools the drink.
- 21. A swimmer starts at point P and swims at 1.2 m/s across a river in the direction towards Q. P is directly facing Q, on the opposite bank of the river of width 60 m. The current in the river is 1.2 m/s. When the swimmer finally reaches the opposite bank, he discovers that he is at R instead of Q.



The distance QR is

Α	30 m	В	50 m
С	60 m	D	72 m

22. A particle is undergoing uniform acceleration. Which of the following graph describes its displacement with time?



23. Oil leaks out from a moving truck at a uniform rate of 5 drops per second. Successive drops of oil on a road along a straight line are found to be separated by 1.0 cm, 1.2 cm, 1.4 cm, 1.6 cm and 1.8 cm respectively.



The motion of the truck can be described as one of

- **A** uniform acceleration.
- **B** zero acceleration.
- **C** decreasing acceleration.
- **D** increasing acceleration.
- 24. When a snowflake falls, it quickly reaches terminal velocity. This happens because
 - A there is no force acting on it.
 - **B** the snowflake has negligible weight.
 - **C** the mass of the snowflake is smaller than its weight.
 - **D** air resistance acting on it is equal to its weight.
- 25. A car driver stepped sharply on the accelerator when the traffic lights turned green. The force on the car varies with time as shown.



Which graph shows how the car's speed varies with time?



- 26. A child stands on the weighing scale. Which of the following pairs of forces is/are (an) action **and** reaction pair(s)?
 - I The force exerted by the child on the scale **and** the force exerted by the scale on the child.
 - II The force exerted by the Earth on the child **and** the force exerted by the child on the Earth.
 - III The force exerted by the Earth on the child **and** the force exerted by the scale on the child.

Α	I only	В	III only
С	I and II only	D	II and III only

27. A wooden block moves across a table top with uniform speed when pulled by a force of 200 N.



If the wooden block is pulled by the same force on top of the table that is now covered with plastic beads, then the block would

- **A** move with constant speed.
- **B** fail to move.
- **C** move with constant acceleration.
- **D** move with constant deceleration.
- 28. Two objects X and Y are identical in size and shape but X has 3 times the mass of Y. When they are both released at the same time from the same height in an evacuated container, they reach the floor of the container at the same time. Which one of the following statements is **NOT** correct?
 - **A** The rate of change of velocity is the same for X and Y.
 - **B** On reaching the floor, the kinetic energy of X is greater than that of Y.
 - **C** On reaching the floor, the speed of X is the same as the speed of Y.
 - **D** The size of the force acting on X is the same as the size of the force acting on Y.

29. A box, O, can be lifted from level A to a higher level B along one of the three paths as shown in the diagram.



Which of the following statements about the amount of work done to lift the object is **correct**?

- A It is the greatest along path P.
- **B** It is the greatest along path R.
- **C** It is greater along path Q than path R.
- **D** It is the same along all paths.
- 30. A force of 1000 N is needed to lift the hook of a crane at a steady velocity. The crane is then used to lift a load of mass 1000 kg at a velocity of 0.50 ms⁻¹.



How much of the power developed by the motor of the crane is used in lifting the hook and the load?

Α	5.0 kW

- **B** 5.5 kW
- **C** 20 kW
- **D** 22 kW

END OF PAPER