SMJK YU HUA KAJANG
PEPERIKSAAN PERTENGAHAN TAHUN 2014

NAME:…….. **FORM: 4 ……..**

Subject: Physics Paper 2
Form: 4A – 4F
Date: 15-5-2014 (Thursday)
Time:7.40 – 10.10 (2 ½ Jam)
No of Candidates: 274
No of printed Pages: **15**

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Instruction to candidates

1. This paper is made up of 2 sections; **Section A** and **Section B**
2. Answer all questions in **Section A**
3. Write the answers for **Section A** in the space provided in the question paper
4. Answer both question each from **Section B**. Answers must be written in the examination pad.
5. Diagrams in this question paper may not be drawn to scale except when stated.
6. Marks allotted for each question is shown below.
7. You are allowed to use non-programmable scientific calculators

Examiners Use			
Section	Question	Full Marks	Marks
A	1	4	
	2	5	
	3	6	
	4	7	
	5	8	
	6	8	
	7	10	
	8	12	
B	9	20	
	10	20	
TOTAL MARKS			

Section A
[60 marks]
Answer all questions in this section

1. Diagram 1 shows a vernier caliper with zero error.

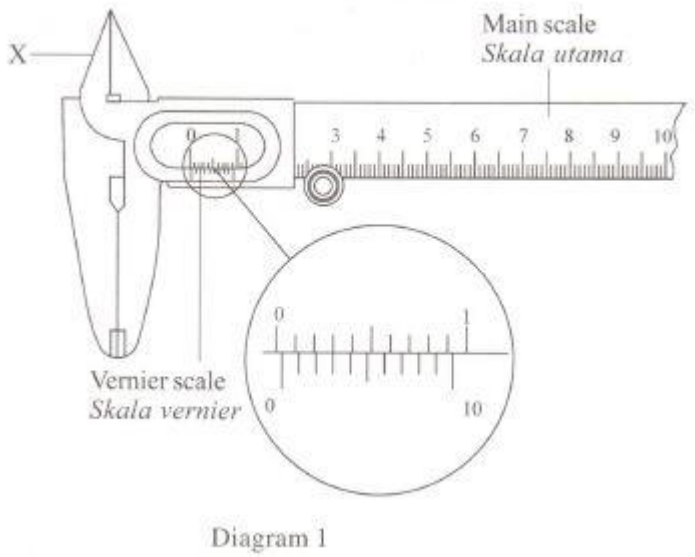


Diagram 1

(a) Underline the correct answer in the bracket to complete the sentence below.

Zero error is an example of (random, systematic) error [1]

(b) Based on Diagram 1

(i) What is the reading of the zero error?

……. cm [1]

(ii) Whats the function of X

…….. [1]

(c) When the vernier caliper is used to measure the thickness of a book, the reading is 4.38 cm. What is the actual reading of the measurement?

…….. cm [1]

2. Diagram 2 shows the motion of a bowling ball and the bowling pin before and after collision.

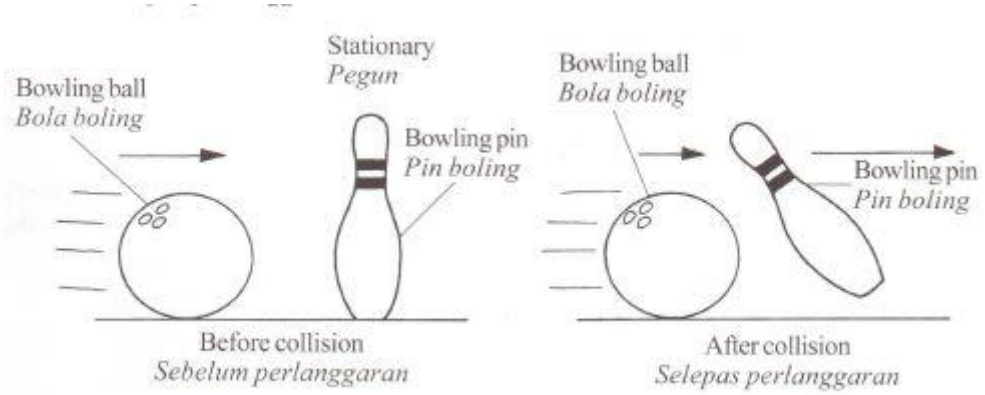


Diagram 2

Table 5 shows the momentum of the bowling ball and the bowling pin before and after collision.

Momentum before collision ($kg\ ms^{-1}$)		**Momentum after collision ($kg\ ms^{-1}$)**	
Bowling Ball	Bowling Pin	Bowling Ball	Bowling Pin
2.5	**0.00**	**0.4**	**2.1**

Table 2

(a) What is the meaning of momentum?

……[1]

(b) Based on Diagram 5 and Table 5, determine the total momentum of the bowling ball and the bowling pin

(i) before the collision [1]

(ii) after the collision [1]

(c) Compare the answers in 2 (b) (i) and 2 (b) (ii)

…….. [1]

(d) (i) Name the physics principle involved

…….. [1]

3. Diagram 3.1 shows a trolley moving down an inclined plane. The ticker timer vibrates at a frequency of 50 Hz. Diagram 3.2 shows the ticket tape produced by the motion of the trolley.

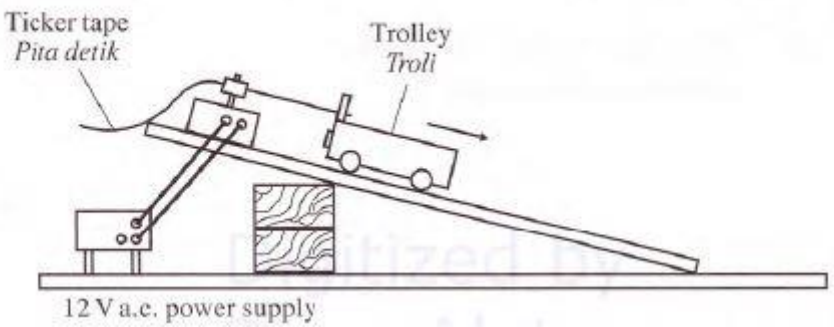


Diagram 3.1

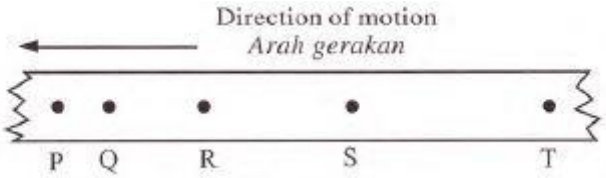


Diagram 3.2

(a) If the distance of PQ = 0.5 cm and the distance of ST is 0.8 cm, calculate

(i) The initial velocity, u in cms^{-1} [1]

(ii) The final velocity, v in cms^{-1} [1]

(iii) Determine the acceleration of the trolley in ms^{-2} [1]

(b) State the type of motion of the trolley

……. [1]

(c) If the mass of the trolley is 1.5kg, calculate the net force acting on the trolley

…….. [1]

(d) Let us say that we have changed the ticker timer frequency to 25 Hz. What would be the new distance of ST.

…… [1]

4. Diagram 4.1 shows a mother pushing a baby stroller of mass 8kg with a constant force of 20N.

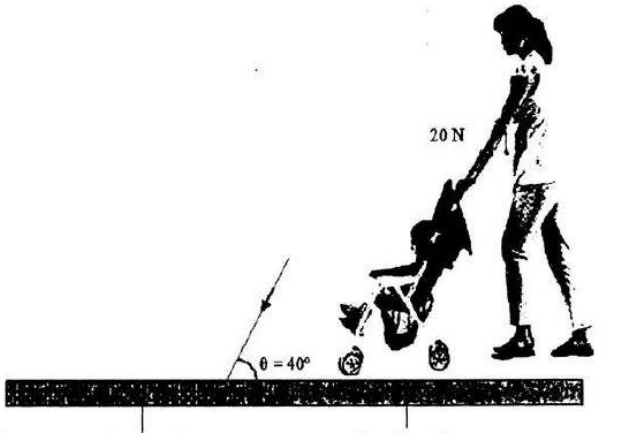


Diagram 4.1

(a) Define Force?

…… [1]

(b) Based on Diagram 4.1,

(i) Calculate the horizontal component of the Force that causes the stroller to move forward.

…… [1]

(ii) Calculate the verticle component of the force that causes the stroller to be heavier

…… [1]

(iii) Determine the reaction force acting on the stroller [1]
(Show a Free Body diagram of the forces acting)

(c) Calculate the acceleration of the stroller on the smooth surface.

…… [2]

(d) Complete the following sentence by **underlining** the correct word
When the stroller moves on the rough surface. The net force acting on the stroller
(**increases , decreases, remains unchanged**) [1]

5. Mei Lan cycles to work everyday. The graph on Figure 5.1 shows a typical velocity-time graph of Mei Lan's journey to work.

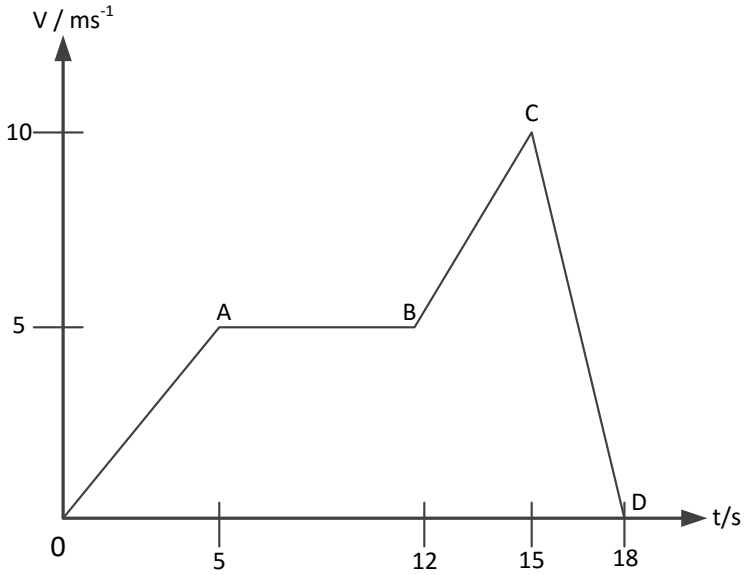


Figure 5.1

(a) Describe the following part of Mei Lan's movement

(i) A to B: ……... [1]

(ii) B to C:……[1]

(iii) C to D:…….. [1]

(b) Calculate the acceleration of the bicycle for the first 3 seconds

…….

…….. [2]

(c) Calculate the total distance travelled

……

…… [2]

(d) Determine the average velocity for the whole journey

…….[1]

6. Figure 6.1 shows a moving car. The car has a mass of 1500kg. Two force acting on the car as shown in Figure 6.1 when it was moving.

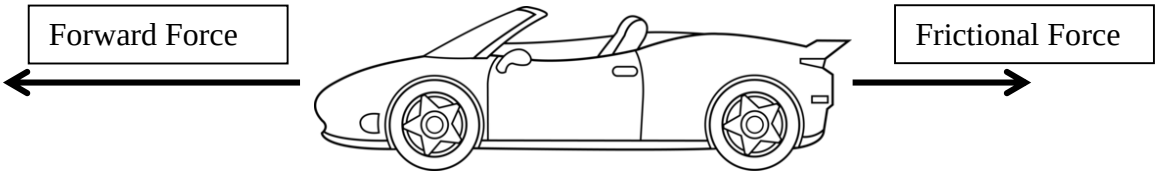


Figure 6.1

(a) Give the relationship between the forward force F_w and the frictional force (F_R) in the following situation

(i) Constant velocity

…… [1]

(ii) Constant acceleration

…… [1]

(iii) Constant deceleration

…… [1]

(b) If the forward force cause by the enjine of the car is 20,000 N and the car accelerates at 5 ms^{-2}, find the frictional force acting on the car [2]

(c) If the car meets with an accident while travelling at 110 kmh^{-1}, and was stopped in a time of 0.5 seconds, calculate the impulsive force on the car

[2]

(d) Suggest 2 ways to reduce the impulsive force calculated in (c)

Way 1:…….. [1]

Way 2:…… [1]

7. Diagram 7 shows a 2kg mirror hung on a wall using strings of the same length. The mirror is in an equilibrium state. (Use g = 10 ms^{-2})

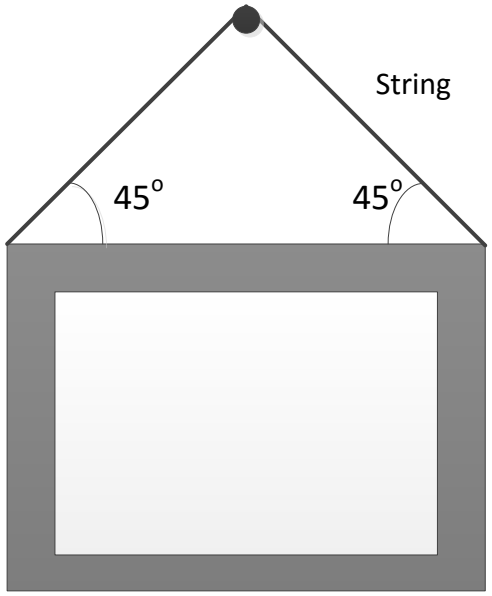


Diagram 7

(a) What does it mean that forces are in equilibrium

……..

…….. [2]

(b) On Diagram 7, label the force that act on the mirror [2]

(c) Draw a triangle of forces based on Diagram 7 above [2]

(d) Determine the resultant Force in Diagram 7

……. [1]

(e) Calculate the tension of the strings T that act on the mirror [2]

(f) The string can withstand a maximum force of 13 N
Based on your answer in 7 (e) , what is going to happen to the string?

……. [1]

8. Table below shows the measurements of the diameter of a test tube by using three instrument X, Y and Z. The actual measurement of the diameter is 1.20cm

Measuring Instrument	**Diameter of test tube / cm**			**Average Reading / cm**
X	1.3	1.2	1.3	
Y	1.24	1.22	1.23	
Z	1.202	1.206	1.204	

(a) Name the measuring instrument X , Y and Z

X : …….. [1]

Y:…… [1]

Z:…… [1]

(b) Calculate the average reading for all the instruments used and fill in the table [2]

(c) Based on your calculation in (b), which is the most accurate instrument

…….. [1]

(d) Diagram 8.1 shows a car of mass 1800kg moving with a constant velocity of 90 kmh^{-1} along even road. The Engine thrust produced is 30,000 N

(i) What happens to the passengers when the car is suddenly stopped due to an accident?

……..

……. [1]

(ii) Name the physics principle involved

……. [1]

(iii) Name 3 safety feature that are engineered into a vehicle that could prevent serious injuries to the driver and passengers .

1. [1]

2. [1]

3. [1]

(iv) If the car moves with a higher speed of 120 kmh^{-1}, predict the frictional force that will act on the car. Give a possible value.

…… [1]

Section B

[40 marks]

Answer both questions in this section

9. Diagram 9.1 shows a boy of mass 60kg standing in a stationary boat of mass 50kg. Diagram 9.2 shows the boat move away from the jetty with a velocity of 6 ms^{-1} when the boy jumped to the jetty with a velocity of 5 ms^{-1}.

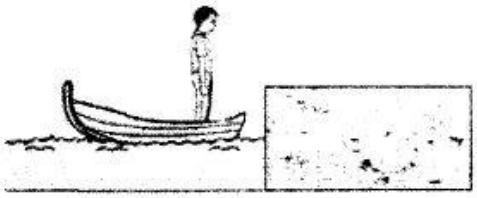


Diagram 9.1

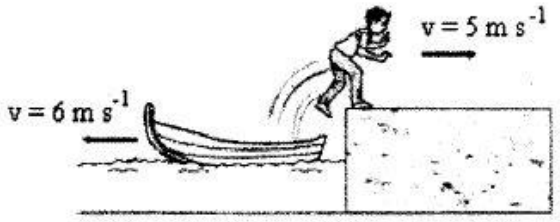


Diagram 9.2

(a) (i) What is meant by momentum? [1]

(ii) What is the total momentum of the and boy and the boat in Diagram 9.1?
Using Diagram 9.2, calculate the total momentum of the boy and the boat after the boy jumped to the jetty.
Using diagram 9.1 and 9.2, compare the total momentum before and after the boy jumped to the jetty
Name the physics principle involved in the above situation

[4]

(b) A train is at rest in a railway station. At time t=0, the train starts to move forward with a uniformly increasing velocity until it reaches a maximum velocity of 36 ms^{-1} at time t=48 s.

(a) (i) Sketch a velocity time graph for the motion of the train above [3]

(ii) Calculate the acceleration of the train during the first 48s of the journey [2]

(c) After the time t=48s, the train continues at its maximum velocity for another 72 s

(i) Show on the sketch above the motion of the train for the 72 s [2]

(ii) Determine the total distance travelled by the train in the 120 s after it start moving [2]

(d) If the train begins to decelerates uniformly after 120s, it moved a distance of 432 m before it comes to a halt

(i) Determine the additional time taken after 120s before it comes to a stop [2]

(ii) Calculate the deceleration at this stage [2]

(iii) Define what is acceleration [2]

10. Diagram 10.1 shows a plasticine ball being dropped onto a metal block. The plasticine ball changes its shape after the impact.

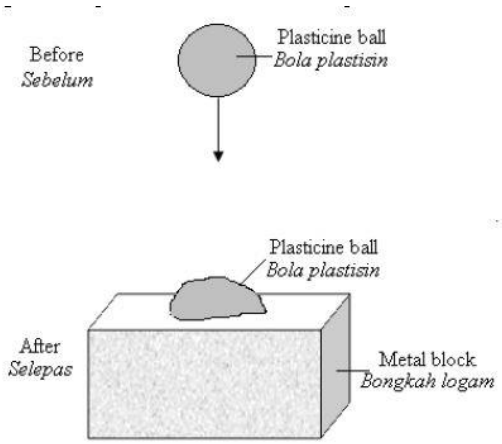


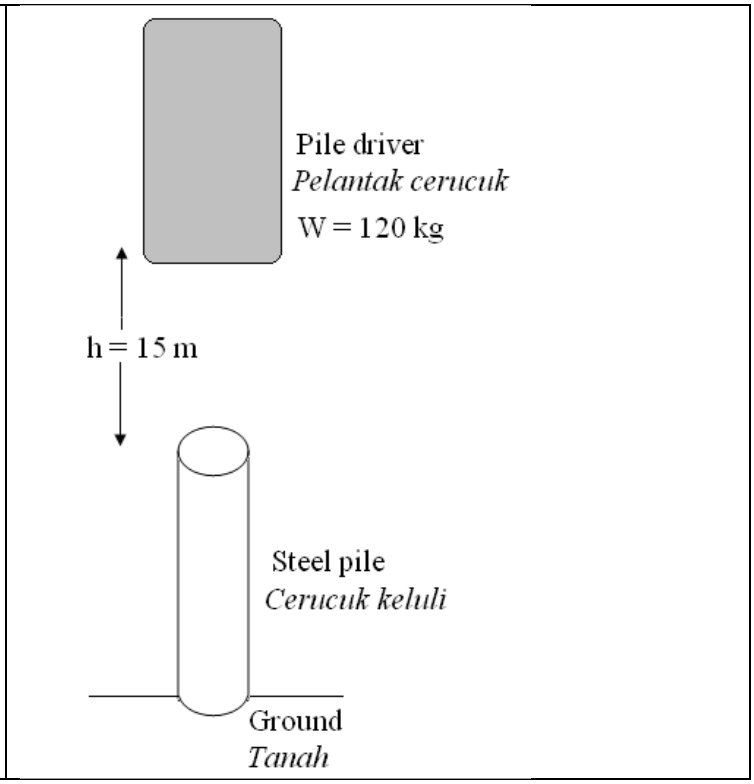
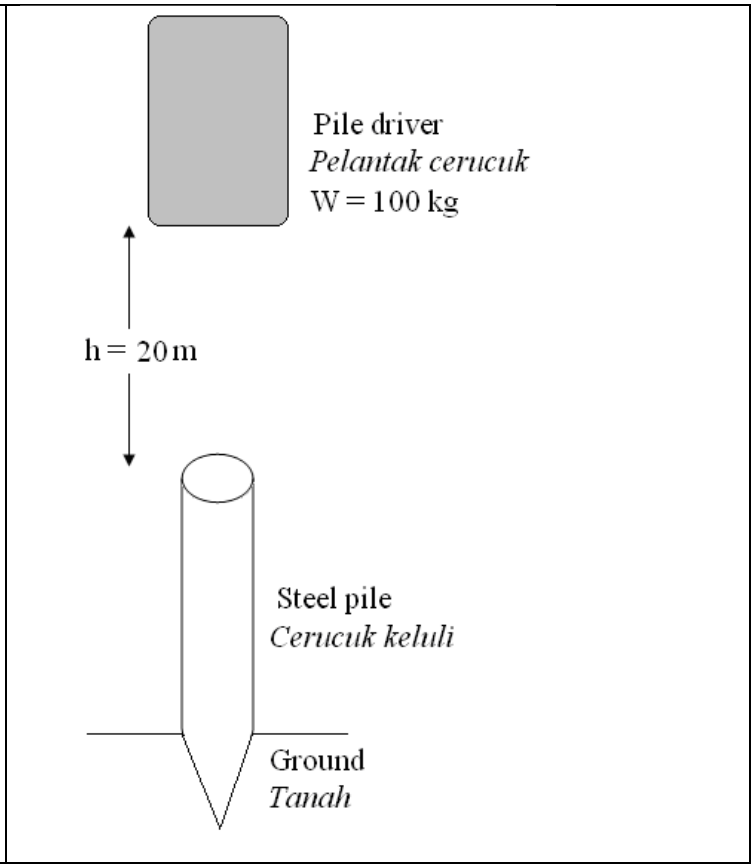
Diagram 10.1

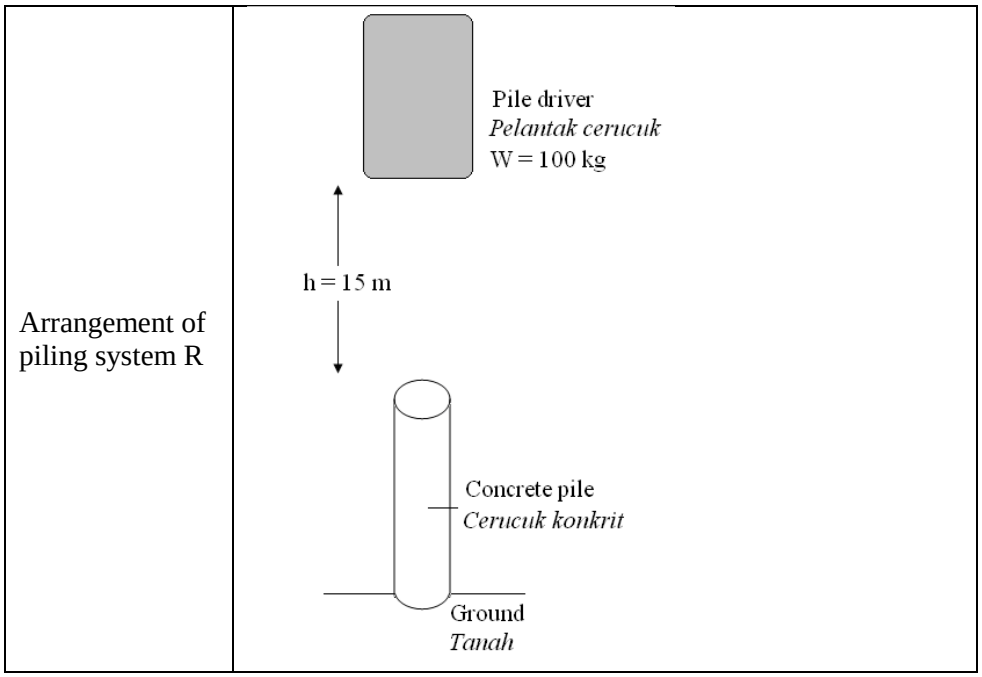
(a) (i) Name the force involved during the impact? [1]

(ii) Explain why the plasticine ball changes its shape after impact [3]

(iii) Give one suggestion to avoid the plasticine ball from changing its shape when being dropped from the same height [1]

(b) Diagram 10.2 shows four arrangement of piling system P, Q, R and S that being used to insert a pile into the ground.

Arrangement of piling system P	
Arrangement of piling system Q	



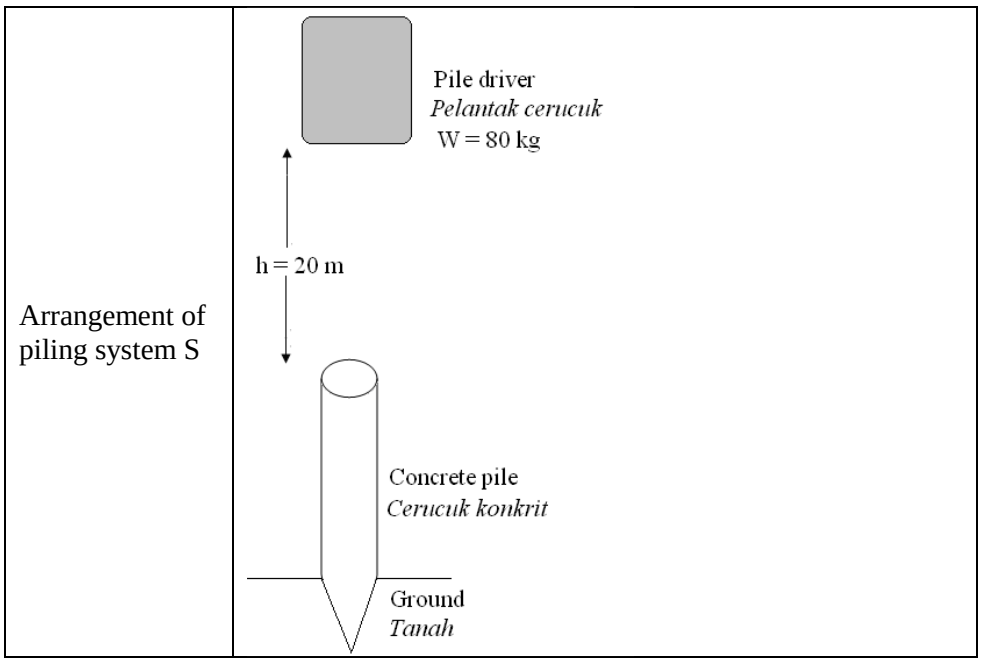


Diagram 10.2

Study the specification of the four arrangement of piling system based on the following aspects:

(i) mass of the pile driver used to push the pile into the ground [2]

(ii) Height of the pile driver [2]

(iii) Pile material [2]

(iv) Shape at the base of the pile [2]

Explain the suitability of each aspect and then determine the most suitable arrangement to be used to insert the pile effectively

Give reasons for your answer [2]

(c) A metal block with a mass of 50kg is being dropped onto a pile to build a tall building. The height of the metal block from the pile is 20m. Calculate
(Use g = 10N/kg)

(i) Weight of the metal block [1]

(ii) Velocity of the metal ball just before it hits the pile [2]

(iii) Impulsive force acting on the pile if the time of impact is 0.5s [2]