Third Form Physics Revision Booklet

How to use this Booklet

This booklet is composed of questions covering the third form syllabus. You can revise at your own pace and start with your weakest topic. You can check your answers with those at the back of the booklet. Your success depends on you!

Revision Hint's

1.   When you go through your notes, underline important words.
2.   Make your own summaries. Write down important points and details.
3.   Use index cards to draw diagrams and label them.
4.   Test yourself using the questions in this booklet and your notes. Learn from the mistakes you make.
5.   Form a study group if you do not revise well alone.

Topics to Revise

1.   Units, Multiples, Prefixes and Standard Form
2.   Density
3.   Forces, Work, Power and Energy - mass, weight, centre of gravity, equilibrium, stability, kinetic energy, potential energy, Forms of energy, energy conservation, F=ma, Newton's laws
4.   Graphs – scales, labelling axes, title, plotting points, line of best fit, gradient, gradient units
5.   Moments
6.   Light – symbols for ray; converging, diverging and parallel beam, formation of shadows, umbra, penumbra, eclipse, pinhole camera, laws of reflection & refraction, image formed by a plane mirror, diagram to show formation of image in plane mirror, mirrors at angles to each other.
7.   Heat – conduction, convection, radiation, expansion, temperature & thermometers

Examination Technique
In General

❖   Get all your stationery ready the night before ‑ you will need a pencil, ruler, pen &calculator.
❖   In the exam read all the instructions very carefully. Make sure you note which questions are compulsory.
❖   The time you spend on a question should be proportionate to the marks.

Multiple Choice Questions

❖   Read the question carefully otherwise you may easily choose the wrong answer. If you are not sure of the correct answer, eliminate the nonsense answers then chose from the rest.

❖   Each question should take 1 – 1½ minutes. If a question is difficult go on to the next one ‑ do not forget to go back and answer it.

Short Answer Questions

❖   One word or a short answer is usually all that is needed for each part.
❖   Be guided by the amount of space or marks allowed for each part of the question.
❖   Even if you are not certain of the answers, try them anyway - **do not leave blanks.**
❖   The time spent on a question should be proportionate to the marks allocated to that question.

Essay Type Questions

If you are asked to draw a diagram, make sure it is large and labelled.

Some words you might see in an essay question can be found in the next section.

Some Terms / Words used in Science (CXC Physics syllabus)

Word/Term	Meaning	Note
Calculate	arrive at the solution to a numerical problem	steps should be shown; units must be included.
Compare	state similarities and differences	
Construct	use specific format to make or draw a graph.	Should have a title, appropriate headings
Define	state concisely the meaning of a word or term	
Determine	find the value of a physical quality	
Describe	provide detailed factual information on the appearance or arrangement of a specific structure or the sequence of a specific process.	descriptions may be in words, drawings or diagrams can be included
Explain	give reasons, based on recall, to account for	
Find	locate a feature or obtain from a graph	
Label	add names to identify structures or parts indicated by pointers	
List	itemize without detail	
Name	give only the name of	
State	provide factual information in concise terms omitting observations	

Units, Multiples Prefixes and Standard Form

1. Complete the following table

Quantity	Symbol for quantity	Unit	Symbol for unit
Mass		Kilogram	
Length		Metre	
Time		Second	
Current		Ampere	
Temperature		Celsius	
		Kelvin	

2. Complete the following table

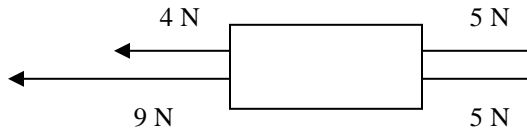| Prefix	Symbol	Meaning	Example
Mega	M	1 000 000 or 10^6	2 Megawatt, 2MW
Kilo			
Centi			
Milli			
Micro	μ		5 Micrometre, 5 μm

3. Numbers written using powers of ten are in standard form. The whole part of the number must be greater than or equal to 1. Complete the following table

Number	Standard Form	Number	Standard Form
270 000	2.7×10^5	0.5	5×10^{-1}
500		0.000 000 6	
20		0.000250	

Forces, Work and Energy

1. a) What is a force? b) In what unit is force measured?

2. What is the formula for force?

3. a) Define mass b) In what unit is mass measured?

4. How would you determine the centre of gravity of a) a regular shape and b) an irregular shape?

5. a) What is weight? b) What is the formula for weight? c) What is the unit for weight?

6. What is the acceleration due to gravity on earth?

7. Complete the following sentences to show the energy transfer that each device is designed for:

   a) An electric kettle is designed to transfer _____energy into _____ energy.
   b) A television set is designed to transfer _____ energy into _____ and _____ energy.
   c) A Bunsen burner is designed to transfer _____ energy into _____ energy.
   d) A microphone is designed to transfer _____ energy into _____ energy.

8. a) What is energy? b) What is the unit for energy? c) What is the symbol for the unit of energy?

9. a) Define potential energy b) What is the formula for potential energy?

10. a) Define kinetic energy b) What is the formula for Kinetic energy?

11. What is the formula for work?

12. What type of equilibrium are the objects shown below in? (stable, unstable or neutral)

13. A model car of mass 2 kg accelerating at 4 ms^{-2}. What is the resultant force on the car?

14. A probe of mass 100 kg is carried to the mars by a spacecraft. (g on the mars is 3.7 ms^{-2})
    a) What is the probe weight on earth? b) What is the mass of the probe on mars?
    c) What is the weight of the probe on mars?

15. A car of mass 4 kg is moving at 5 ms^{-1}. What is its kinetic energy?

16. State Newton's three laws of motion.

17. What is the resultant force in the diagram?

18. a) Define power b) What is the formula for power?

19. A boy whose weight is 600N runs up a flight of stairs 10 m high in 12 s.
    a) How much work is done by the boy?
    b) How much power does he develop?

Density

1. a) Define density? b) State two different units for density?

2. How would you find the volume of an object which has a) a regular shape, b) an irregular shape which can not fit in a measuring cylinder?

3. A measuring cylinder has in 125 cm^3 of water, and irregular object of mass 20 g is lowered into the water. When the object is completely submerged the measuring cylinder shows a reading of 175 cm^3.
   a) What is the volume of the object? b) What is the density of the object?
4. The mass of air in an object is 800 kg, if the density of air is 1.2 kgm^{-3}. What is the volume of the air in the object?

Graphs
Notes on drawing a graph

1. *Chose the largest convenient scale for your axes* – make sure that all your readings will fit on the graph paper before you decide on each scale.

2. *Label your axes* – each axis should show what is being measured and the units being used.

3. *Plot the points with small x's or dots with circles*

4. *Draw the best line you can through the points* – decide whether the line should go through the origin. The draw the straight line or smooth curve which goes closest to most of the points.

5. *Do not forget to write the title of the graph*.

6. $$\text{gradient} = \frac{y_1 - y_2}{x_1 - x_2}$$

Use the graph below to answer questions 1 to 3.

Extension of spring
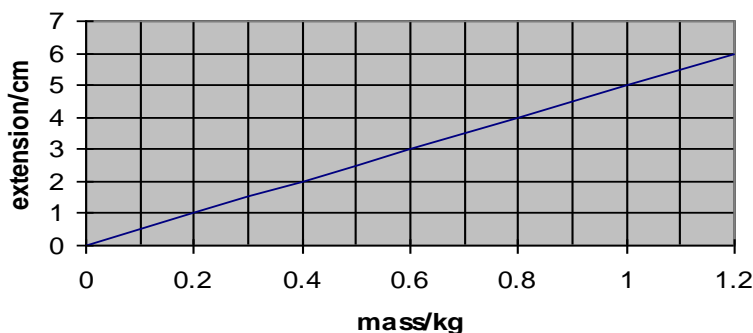
1. What is the extension of spring when a mass of 0.3kg is attached?
2. What mass would extend the spring 4 cm?
3. Determine the gradient of the line.

Light

1. Draw diagrams to illustrate the following a) a ray   b) converging beam   c) diverging beam   d) parallel beam

2. Define the following terms a) opaque   b) transparent   c) translucent   d) luminous   e) non-luminous

3. State the laws of reflection.

4. State 4 facts about the image formed by a plane mirror.

5. Complete the diagram to show how the image of the object is formed.

Third Form Revision Physics
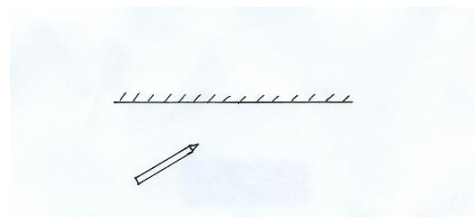
6.   Draw a diagram to show the formation of shadow/s by a) point light source   b) extended light source

7.   On what principal does a simple periscope work?

8.   Copy and complete the diagrams to show the path of light ray.
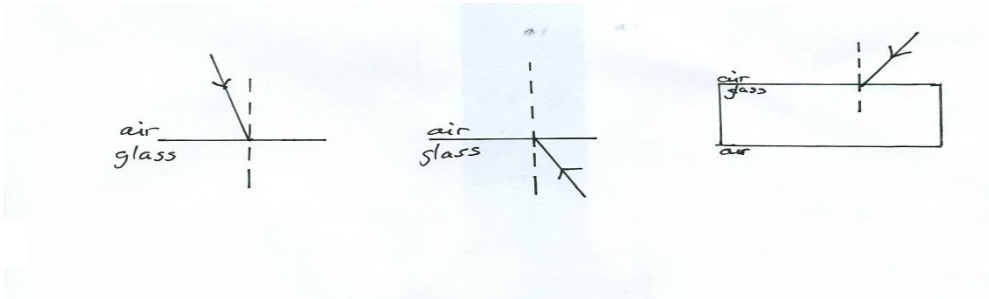

9.   a) State the laws of refraction.
      b) What is the refractive index of a material if $i = 30°$ and $r = 45°$
      c) What is the value of i given that $r = 30°$ and $n = 0.5$

Moments
1.   State the principle of moments
2.   What is meant by the moment of a force about a point?
3.   What is the formula for moment?
4.   A 60 N force acts 0.5 m from the pivot a second force of 50 N acts 0.2 m from the pivot (see diagram). What force F acting 0.5m from the pivot will balance them?
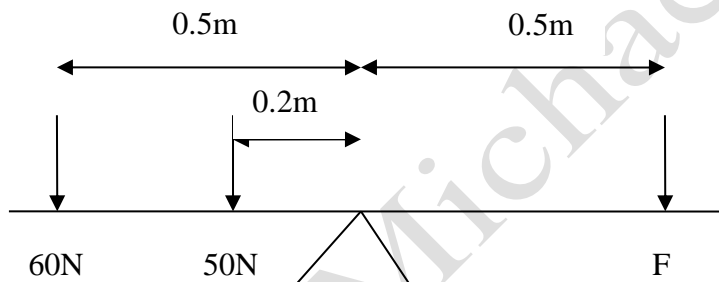
5.   The load of a wheelbarrow is 800N it acts at 60 cm from the fulcrum. What effort is needed at 120 cm from the fulcrum to lift the load?
6.   Identify the order of the levers below
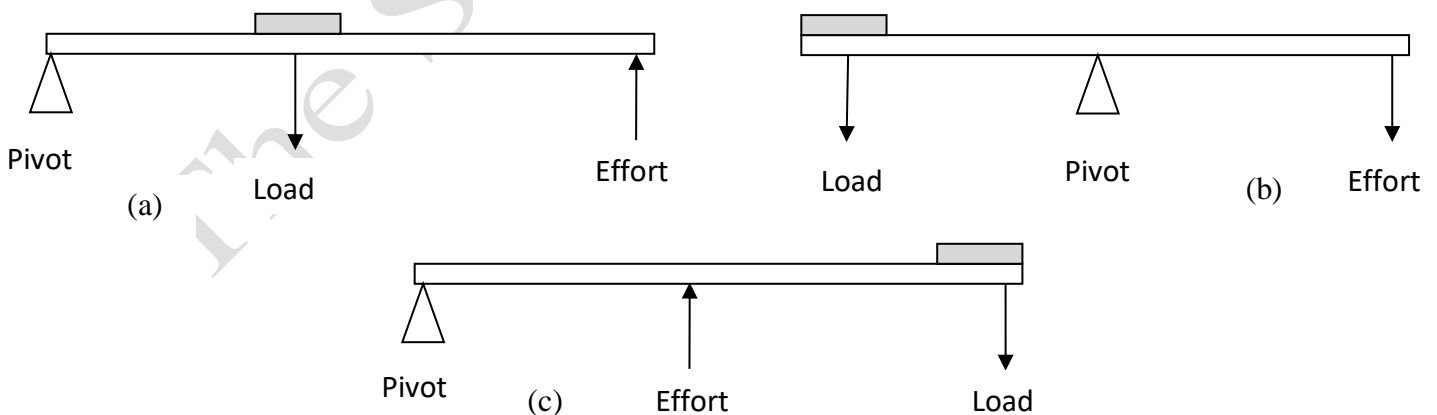
Heat

1. State 3 effects of heat on a body.

2. Describe experiments to show that a) liquids b) solids and c) gases expand on heating.

3. What are a) the lower fixed point and b) the upper fixed point.

4. Draw a clearly labelled diagram of a clinical thermometer and state its features.

5. Define the following terms a) conduction b) convection and c) radiation.

6. Draw a clearly labelled diagram of a vacuum flask. How is heat loss prevented by conduction, convection and radiation?

Answers

Units, Multiples, Prefixes and Standard Form

Quantity	Symbol for quantity	Unit	Symbol for unit
Mass	m	Kilogram	kg
Length	l	Metre	m
Time	t	Second	s
Current	I	Ampere	A
Temperature	Θ	Degrees Celsius	ºC
	T	Kelvin	K

Prefix	Symbol	meaning	Example
Mega	M	1 000 000 or 10^6	2 Megawatts, 2MW
Kilo	k	1 000 or 10^3	5.7 kilograms, 5.7 kg
Centi	c	1/100 or 10^{-2}	23 centimetres, 23cm
Milli	m	1/1000 or 10^{-3}	6 milligrams, 6mg
Micro	μ	1/ 1 000 000 or 10^{-6}	5 Micrometres, 5 μm

Number	Standard Form	Number	Standard Form
270 000	2.7×10^5	0.5	5×10^{-1}
500	5×10^2	0.000 000 6	6×10^{-7}
20	2×10^1 or 2×10	0. 000250	2.5×10^{-4}

Forces, Work and Energy

1. a) a push or a pull b) Newtons   **2**. F = ma   **3**. a) Mass is the amount of matter in a body   b) kilograms

4. a) Regular shape determine its centre b) place 3 holes near edge of shape, suspend shape attach plumbline to suspension point, mark position of line, repeat for other holes, where lines cross is centre of gravity.

5. a) Weight is a force, it is the pull on a body caused by the earth   b) W = mg   c) Newtons   **6**. $10ms^{-2}$ or 10 Nkg^{-1}

7. a) electrical, heat   b) electric, light, sound   c) chemical, heat   d) sound, electrical

8. a) Energy is the ability to do work.   b) Joule   c) J   **9**. a) The energy an object has because of its position   b) E_p=mgh

10. a) The energy an object has because of its motion   b) E_k= ½ mv^2 **11**. Work done = force x distance

12. stable, neutral and unstable   **13**. 8 N   **14**. a) 1000 N   b) 100 kg   c) 370 N   **15**. 50 J.

16. 1st Law - If an object has no force on it, it will remain stationary if still or if it is moving it will continue moving at a steady speed in a straight line. 2nd Law – F = ma.   3rd Law – For every action, there is an equal and opposite reaction

17. 3 N to left   18. a) the rate of doing work   b) P = E/t   19. a) 6000J   b) 500 W

Density

1. a) Density is the mass per unit volume of a substance.   b) gcm^{-3} and kgm^{-3}

2. a) Calculate the volume use mathematical formula   b) Place water in displacement can leave over edge of sink until it stops dripping. Place known volume of water in measuring cylinder. Place measuring cylinder below spout of displacement can, lower object into can, collect all water in measuring cylinder. Difference in initial and final volume is volume of object.

3. a) 50 cm^3 b) 0.4 g cm^{-3} 4.   666.7 m^3

Graphs 1.   1.5 cm   2.   0.8 kg   3.   gradient $= \dfrac{5-2}{1-0.4} = \dfrac{3}{0.6} = 5\,cm/kg$
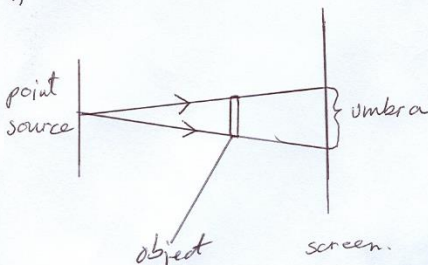
Light

1.
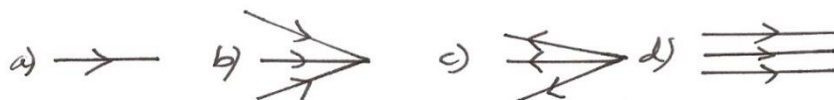
2. a) does not transmit light b) object allows light to pass through it so that it can be seen through c) object allows some light to pass through but in such a way that objects cannot be seen through it. d) object which gives off its own light   e) object which does not give off their own light

3. Angle of incidence equal angle of reflection; angle of incidence, angle of refection and the normal lie on same plane.

4. The same size as the object; the same distance behind the mirror as the image is in front; laterally inverted – left becomes right and right becomes left; virtual – light appears to come from the image
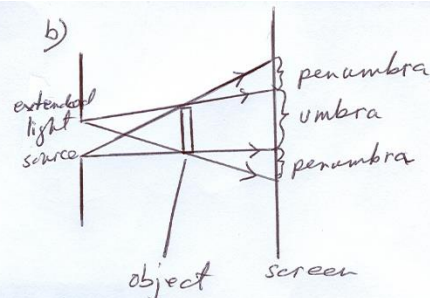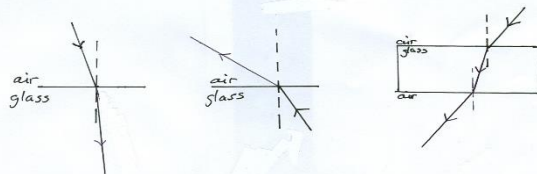
5.

6.
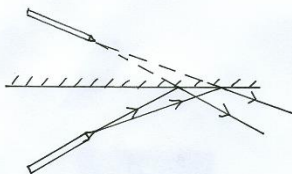
7. The mirrors in a periscope are placed at 45º so that light is turned through a 90º angle.

8.

9. a) angle of incidence, angle of refection and the normal lie on dame plane; $\dfrac{sine\ i}{sine\ r} = n$ b) n =0.7   c) i =14.5º

Moments

1. When a body is in equilibrium the sum of the clockwise moments about the pivot are equal to the sum of the anticlockwise moments.

2. The turning effect of the force about the pivot

3. moment = force X distance

4. 80 N   5. 400 N   6.   Order 2, order 1, order 3

Heat

1. Any three: the temperature increases; increase in size; change in state; change in chemical composition; change in electrical properties; change in colour.

2. **Solid** (ball and ring) Method: Pass metal ball through ring at room temperature. Heat ball using Bunsen burner. Pass metal ball through ring again. Ball cannot pass through (solid expanded). **Liquid** Method: Completely fill a flat bottom flask with coloured water. Place tube in cork and cover flask. Mark position of water in tube with china marker. Heat flask using Bunsen burner. Mark new water level on tube. Level higher (liquid expanded). **Gas** Method: Place end of tubing attached to empty flask in a beaker of water. Heat the flask with your hands or a Bunsen burner. Bubbles appear in water (gas expanded).

3. Lower fixed point 0°C, melting point of pure ice. Upper fixed point 100°C, temperature of steam.

4.

b) A clinical thermometer
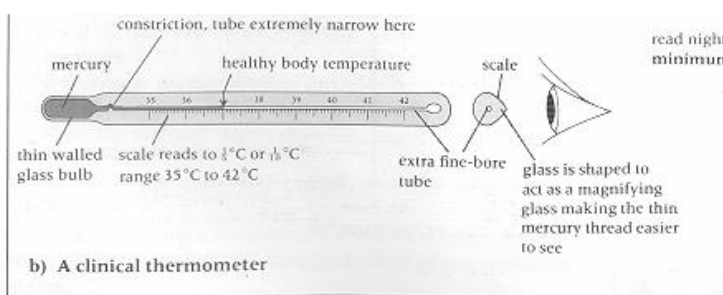
5. a) conduction is the transfer of heat through a material, which is not at uniform temperature, without movement of the material itself.

    b) convection is the transfer of heat energy by circulation of the material due to differences in temperature.

    c) radiation is the transfer of heat energy by means of electromagnetic waves without the need of a material medium.

6.
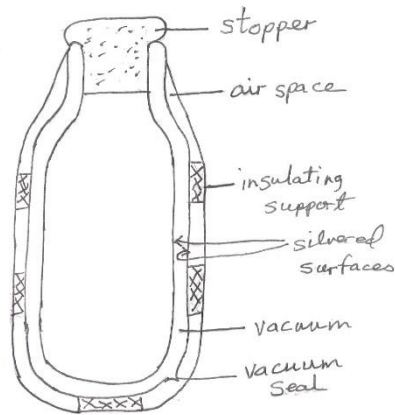
Conduction is reduced by using a cork or plastic stopper filled with an insulation material. The vacuum also prevents heat loss by conduction. **Convection** is also prevented by vacuum and the still air between the glass container and the case. **Radiation** is reduced by the silvered in walls of the doubled walled glass container