Arkwright SCHOLARSHIPS

APTITUDE PAPER

FOR SCHOLARSHIPS TO BE AWARDED
IN SEPTEMBER 2007

WEDNESDAY 7TH FEBRUARY 2007
DURATION 2 HOURS

INSTRUCTIONS TO CANDIDATES

You are required to answer **ONE** question only.

In your answers you should;

		Mark	Suggested Time In Minutes
a)	Develop a **full** specification that offers supporting reasons behind each important point	15	20 mins
b)	Produce at least **three** initial concepts, which demonstrate **flair and imagination** that relate to the specification. **Candidates should identify the relative merits of the ideas introduced.**	45	60 mins
c)	Develop your preferred solution. You should address the following: ♦ Materials ♦ Construction ♦ Function ♦ Features ♦ Sizes/Dimensions	30	40 mins
d)	Demonstrate an organised, logical and well presented response.	10	
	TOTAL MARKS	**100**	

ALL YOUR A3 ANSWER SHEETS MUST HAVE IN THE TOP RIGHT HAND CORNER

- ♦ Your name and school clearly printed
- ♦ The number of the question you have chosen to answer.
- ♦ The page number

DO NOT TURN OVER UNTIL YOU ARE INSTRUCTED TO DO SO

ALL ANSWERS MUST CLEARLY SHOW ALL CONSTRUCTIONAL DETAILS, MECHANISMS AND/OR CIRCUITS.

QUESTION 1

A major department store has found that sales of sports equipment has fallen and in order to raise customer awareness they require a window display that customers can interact with as they pass.
The display is required for the approaching summer season and you are required to design a moving display for a sport of your choice, e.g. cricket, swimming, athletics.
The movement in the display must last for a minimum of 30 seconds and can be activated by a sensor that detects an onlooker standing at the window. You are also required to design the background setting of the display.
Low voltage power, electronic sub systems, a computer interface and a source of compressed air are available.

Systems diagrams should be included.

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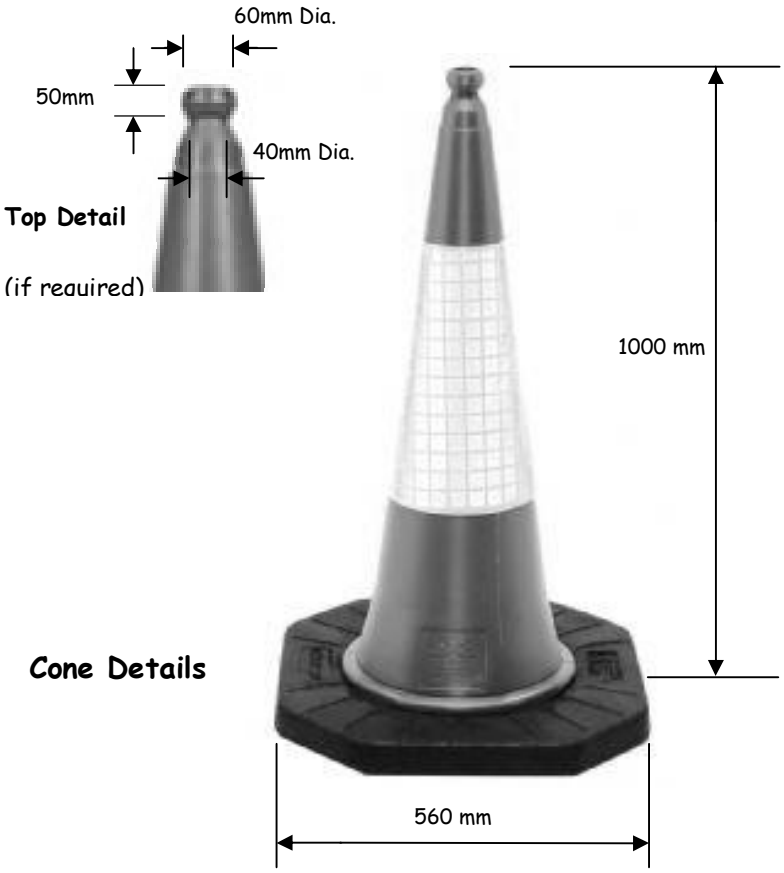
QUESTION 2

Placing cones on motorways is a very hazardous operation often carried out by people actually walking in the road with very fast moving traffic very close to them.

Design an automatic cone placing system that could be fitted to a lorry flatbed platform and operate efficiently as the lorry moves slowly along. Show how the cone is held when being put down. Include full details of materials to be used and specific methods of constructing the placing unit.



Cone Details

Cone Specification:

- cone weight 9.0Kg each;
- studded underside of base for optimum grip and non slip on road surfaces;
- base dimension 560 x 560mm;
- stacking compatibility with other cones for ease of storage.

QUESTION 3

Your local paper shop has decided to improve the delivery of newspapers to their customers.

There are three specific problems that have to be overcome:

- the delivery person is only able to carry a limited number of papers;
- the papers become wet in rainfall;
- the instability of the rider on a bicycle due to uneven loading.

The newspaper transporter / carrier should be easy to attach to the frame of an existing bicycle.

The unit should provide space for an advertisement for a sponsor, should be adaptable for different sizes of newspapers and be safe for the rider to use.

You must provide details of the materials from which it will be constructed and how it will be attached to the existing bicycle.

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