

SAMPLE DESIGN AND TECHNOLOGY

GCSE EXAMINATION PAPER (SAMPLE 2)

CENTRE NUMBER

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

CANDIDATE NUMBER

| | | | |
|--|--|--|--|
| | | | |
|--|--|--|--|

SURNAME _____

FORENAME(S) _____

CANDIDATE SIGNATURE _____

2 HOURS ALLOWED

Materials required for this examination:

- normal writing and drawing instruments
- a calculator
- a protractor.

Instructions to candidates:

- Use black ink or black ball-point pen. Use pencil only for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write on blank pages.
- Do all rough work in this book. Cross through any work that you do not want to be marked.

Information

- The marks for questions are displayed.
- The maximum mark for this paper is 135.
- There are 22 marks for Section A, 38 marks for Section B and 75 marks for Section C.

This example examination paper can be duplicated and printed out if required but not edited in any way.

The links to www.technologystudent.com cannot be removed.

The PDF file can be stored on school / college systems and distributed electronically (NO EDITING ALLOWED)

PLEASE RESPECT THE COPYRIGHT - report infringers to techteacher@technologystudent.com
Not be distributed at courses or by course instructors / consultants

CORE TECHNICAL PRINCIPLES - SECTION A

The questions to follow are multiple choice. Tick one answer for each question.

WORLD ASSOCIATION OF TECHNOLOGY TEACHERS <https://www.facebook.com/groups/254963448192823/> www.technologystudent.com © 2018 V.Ryan © 2018

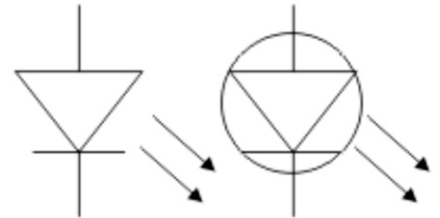
1. What does the electronics symbol opposite represent?

A. Resistor

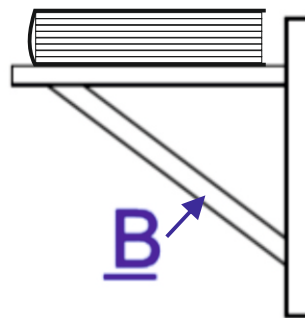
B. LED

C. Push switch

D. Magnetic door switch



2. The drawing below shows book shelf. What is the force applied to part B?



A. Tension

B. Compression

C. Torsion

D. Shear

3. Which of the following materials is produced from natural wood?

A. Styroflex

B. Arnitel

C. Polyethylene terephthalate

D. Veneer

4. From the list of materials, identify the synthetic fibre that is often used in textiles production.

A. Copper

B. Nylon

C. Stainless steel

D. Lead

5. Which of the following systems, means manufacturing in another country?

A. Prototype manufacture.

B. Remote manufacture

C. Batch production

D. Mass manufacture

6. Which of the following statements is true?

A. QA means 'Quality Assets'

B. Steel is a common non-ferrous metal.

C. Annealing a metal makes it easier to shape and form.

D. A dovetail joint is a knock down joint.

7. Which of the statements below is the definition of the physical property 'Toughness'?

A. A characteristic of a material that does not break or shatter when receiving a blow or under a sudden shock.

B. The ability of a material to change shape (deform) usually by stretching along its length.

C. The ability of a material to stretch without breaking or snapping.

D. The ability of a material to absorb force and flex in different directions, returning to its original position.

8. A company owned by its members, often with social aims as well as economic ones, reinvesting some of their profits in the local community. This type of company is called?

A. A Community Businesses.

B. A Cooperative.

C. A Privately Owned Company (POC).

D. A Government and Community Alliance.

9. Which of the following 'finishes' is used on Aluminium.

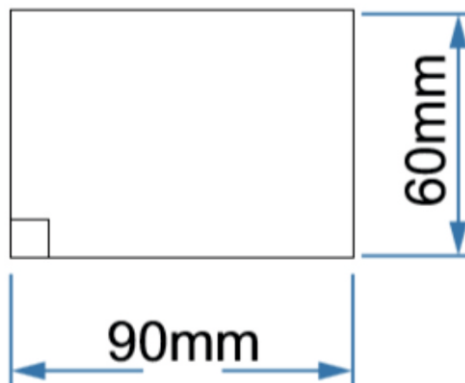
A. Anodising.

B. Varnish.

C. Galvanising

D. Shellac

10. What is the area of the rectangle shown below?



A. 550mm²

B. 5000mm²

C. 5800mm²

D. 5400mm²

TO HELP YOU ANSWER THIS QUESTION http://www.technologystudent.com/joints_flesh/metalfoam1.html

11. Describe two properties of metal foams, that make them more suitable than solid sections, in the manufacture of some products / components. 2 marks

WORLD ASSOCIATION OF TECHNOLOGY TEACHERS <https://www.facebook.com/groups/254963448192823/> www.technologystudent.com © 2018 V.Ryan © 2018

Property 1:

*Answers could include:
lightweight in comparison to solid form.
Low conductivity.*

Property 2:

*Compressive strength
Absorption of a force
See the link for more detail*

TO HELP YOU ANSWER THIS QUESTION http://www.technologystudent.com/joints_flesh/metalfoam1.html

12. Describe two practical applications of metal foams. 2 marks

Reason 1:

Follow the link above for four possible answers.

They include: crumple zones, pan handles, structural strength in car bodywork.

Reason 2:

TO HELP YOU ANSWER THIS QUESTION <http://www.technologystudent.com/energy1/wind8.htm>

13. Wind power is a popular form of energy production. Give two reasons for its increase in popularity. 2 marks

Reason 1:

*Follow the link above to view range of possible answers.
Also, use teacher discretion.*

Reason 2:

TO HELP YOU ANSWER THIS QUESTION <http://www.technologystudent.com/energy1/wind8.htm>

14. Give two reasons why some people are not in favour of wind power. 2 marks

WORLD ASSOCIATION OF TECHNOLOGY TEACHERS <https://www.facebook.com/groups/254963448192823/> www.technologystudent.com © 2018 V.Ryan © 2018

Reason 1:

*Follow the link above to view range of possible answers.
Also, use teacher discretion.*

1 mark per reason.

Reason 2:

TO HELP YOU ANSWER THIS QUESTION <http://www.technologystudent.com/pdf14/ratios1.pdf>

PAGE 12

15. Part of a food recipe to serve two people, requires 4 cups of flour and 1 cup of water. If it is scaled up to serve 10 people, how many cups of flour and water will be required? 4 marks

| | | | |
|-----------------|------------|---|------------|
| SERVES 2 PEOPLE | FLOUR 4 | : | WATER 1 |
|-----------------|------------|---|------------|

EXPLANATION: _____

Follow link for full answer and explanation.

Award up to two marks for explanation and two for the calculation.

FLOUR : WATER
4 : 1

$\frac{10 \text{ PEOPLE}}{2 \text{ PEOPLE}} = 5$

4x5 : 1x5
FLOUR : WATER
20 : 5

SECTION B - Specialist Technical Principles

POLYPROPYLENE

SUSTAINABLE
NATURAL WOOD

POLYLACTIDE.

16. Select one of the materials listed above.

Identify the materials primary source (where it comes from) 1 mark

Name of Material _____ *A material must be named.*

Primary Source (where it comes from) _____ *1 mark to be awarded.*

In the space below, explain how the material is manufactured / produced from its primary source. 4 marks

TO HELP YOU ANSWER
THIS QUESTION

<http://www.technologystudent.com/joints/oiltoplas1.html>
<http://www.technologystudent.com/prddes1/susenv1.html>
<http://www.technologystudent.com/joints/pla1.htm>
<http://www.technologystudent.com/joints/poly2.html>

1 mark for minimum knowledge.

2 marks for basic knowledge of the process.

3 marks for reasonable detail of the process - notes / labels and sketch.

4. Full answer - notes and sketches in detail.

SEE LINKS FOR FULL EXAMPLES.

TO HELP YOU ANSWER
THIS QUESTION

http://www.technologystudent.com/despro_fish/mats_finish1.html

17. Describe two ways in which metals are given a 'finish' to enhance and protect their surface. 2 x 2 marks

Finish 1:

1 mark for the name of each finish and 1 mark for a description.

Follow link above for sample answers.

WORLD ASSOCIATION OF TECHNOLOGY TEACHERS

<https://www.facebook.com/groups/254963448192823/>

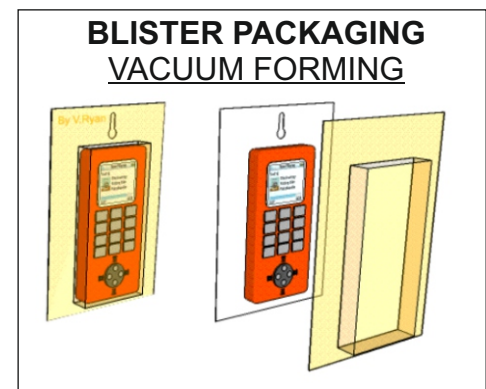
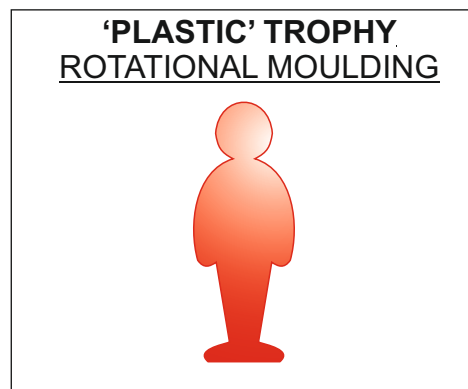
www.technologystudent.com © 2018 V.Ryan © 2018

Finish 2:

1 mark for the name of each finish and 1 mark for a description.

Follow link above for sample answers.

18. Select one of the products shown below. Then, describe two reasons, for it being suitable for manufacture in large numbers / mass production. 2 x 2 marks



TO HELP YOU ANSWER
THIS QUESTION

<http://www.technologystudent.com/joints/desk8.htm>
<http://www.technologystudent.com/prddes1/rotate2.html>
<http://www.technologystudent.com/gprep07/vac2.html>

PRODUCT: *Product must be named for any marks.*

REASON 1:

Up to two marks depending on the detail / description

1 mark for very basic answer. 2 marks for detailed answer

REASON 2:

Up to two marks depending on the detail / description

1 mark for very basic answer. 2 marks for detailed answer

19. For the product you selected in question 18 - describe / explain the industrial process used in it's manufacture. The industrial process is listed under the product name. 5 marks

TO HELP YOU ANSWER
THIS QUESTION

<http://www.technologystudent.com/joints/desk8.htm>
<http://www.technologystudent.com/prddes1/rotate2.html>
<http://www.technologystudent.com/gprep07/vac2.html>

INDUSTRIAL PROCESS: _____

DESCRIPTION OF MANUFACTURING PROCESS
INCLUDE NOTES AND A SKETCH(S)

Follow the link to see sample answers

1 to 2 marks for limited knowledge - notes or sketch

*3 - 5 marks for notes, sketch and labels (3 marks reason
knowledge displayed - higher mark dependent on detail and clarity
of explanation)*

20. Packaging has a range of important functions. Describe 2 functions, in detail, in the area below. 2 x 4 marks

TO HELP YOU ANSWER
THIS QUESTION

Follow the links below.

www.technologystudent.com/despro2/packfn1.htm

FUNCTION 1:

Follow link to view range of functions.

Award 1 mark for title / subtitle and between 2 - 4 for answer that includes description / explanation, dependent on level of detail.

FUNCTION 2:

Follow link to view range of functions.

Award 1 mark for title / subtitle and between 2 - 4 for answer that includes description / explanation, dependent on level of detail.

TO HELP YOU ANSWER
THIS QUESTION

Follow the links below.

<http://www.technologystudent.com/prddes1/custom1.html>

21a. There is a difference between a CUSTOMER and a CLIENT. Write a description / explanation of a customer and a client. 2 x 4 marks

WORLD ASSOCIATION OF TECHNOLOGY TEACHERS

<https://www.facebook.com/groups/254963448192823/>

www.technologystudent.com © 2018 V.Ryan © 2018

CUSTOMER:

Follow link to view range of differences.

Award 1 mark to 2 marks for basic answer and between 3 - 4 for answer that includes description / explanation, dependent on level of detail.

CLIENT:

Follow link to view range of differences.

Award 1 mark to 2 marks for basic answer and between 3 - 4 for answer that includes description / explanation, dependent on level of detail.

21b. What is the difference between Service Industry and Manufacturing industry. In your answer give an example of a service industry and manufacturing industry? 4 marks

Service Industry also called Tertiary Sector.

A company / business that offers / sells a service which could include insurance, banking, trades, cafes, restaurants etc...

NOT MANUFACTURING A PRODUCT

Manufacturing industry.

A business / company that manufactures a tangible product made from materials.

Manufacturers of cars, planes, pens, pencils etc.....

NOT SELLING A SERVICE.

SECTION C - DESIGNING AND MAKING PRINCIPLES

GARDENING TROLLEY FOR THE ELDERLY



MAIN SPECIFICATION REQUIREMENTS

- 1. Requirement:** The trolley should be easy to manoeuvre around the garden.
- 2. Requirement:** The trolley should be lightweight, so that it is easy to move over soft ground, such as grass and soil.
- 3. Requirement:** Recycled and sustainable materials should be used to manufacture the trolley and its wheels.

22a. This question is about the product analysis of the garden trolley, seen on the previous page. The aim of product analysis is to help the designer develop even better designs and products in the future.

Study the gardening trolley carefully (consider it's use by the elderly) and then complete the analysis by writing down your thoughts on the follow points: 4 x 2 marks 8 in total

TO HELP YOU ANSWER
THIS QUESTION

Follow the link below.
http://www.technologystudent.com/joints_flsh/garden1.html

MATERIALS:

Follow the link to view sample basic answers.

1 mark for basic / simple answer.

2 marks for more detailed answer and level of analysis.

WHEELS:

Follow the link to view sample basic answers.

1 mark for basic / simple answer.

2 marks for more detailed answer and level of analysis.

WEIGHT:

Follow the link to view sample basic answers.

1 mark for basic / simple answer.

2 marks for more detailed answer and level of analysis.

HANDLE:

Follow the link to view sample basic answers.

1 mark for basic / simple answer.

2 marks for more detailed answer and level of analysis.

TO HELP YOU ANSWER THIS QUESTION Follow the link below.

<http://www.technologystudent.com/prddes1/standard1.html>

WORLD ASSOCIATION OF TECHNOLOGY TEACHERS <https://www.facebook.com/groups/254963448192823/> www.technologystudent.com © 2018 V.Ryan © 2018

**23a. What is a standard component. Give one or more examples in your answer.
4 marks**

Follow link for sample answer and points / facts that can be included.

1 mark for an example of a standard component, without and explanation.

2 to 4 marks for an explanation of standardised components.

TO HELP YOU ANSWER THIS QUESTION Follow the link below.

<http://www.technologystudent.com/prddes1/standard9.html>

23b. Write 4 advantages to a designer and manufacturer, of using standard components in a new product. 4 marks

Follow link for detailed explanation of advantages.

A mark should be awarded for each advantage. e.g. 4 marks for 4 advantages.

TO HELP YOU ANSWER THIS QUESTION Follow the link below.

<http://www.technologystudent.com/prddes1/repair1.html>

WORLD ASSOCIATION OF TECHNOLOGY TEACHERS

<https://www.facebook.com/groups/254963448192823/>

www.technologystudent.com © 2018 V.Ryan © 2018

24a. Customers often purchase products that can be repaired when faults develop, rather than throwing away a faulty product and buying a replacement ?

What are the advantages to the customer of buying a repairable product ? 5 marks

Follow the link to view a range of advantages.

Award a mark for each advantage, up to 5 marks.

24b. Explain why it is important, to be able to repair each of the parts of the electric kettle, identified on the photograph. 3 marks



Element will eventually fail - main component that eventually wears out- when repaired the kettle will perform as new.

Mains lead is dangerous if a fault develops as it carries 240 volts. Must be replaced for Health and safety reasons.

Fuse is necessary for safety. It will 'blow' if there is a 'spike' in electrical supply or a fault developed with the kettle. Without a fuse the kettle will not work. Fuses are very cheap and essential.

TO HELP YOU ANSWER THIS QUESTION Follow the link below.

<http://www.technologystudent.com/joints/prddes1.htm>

WORLD ASSOCIATION OF TECHNOLOGY TEACHERS

<https://www.facebook.com/groups/254963448192823/>

www.technologystudent.com © 2018 V.Ryan © 2018

25. Designers have to take account of factors, that affect the development of a product, when they are designing. Describe / explain 4 factors. 4 x 2 marks (8 marks in total)

FACTOR 1:

*Follow the link for some examples of a variety of factors.
Teacher discretion required. Up to 2 marks awarded dependent on level of detail / explanation.*

FACTOR 2:

*Follow the link for some examples of a variety of factors.
Teacher discretion required. Up to 2 marks awarded dependent on level of detail / explanation.*

FACTOR 3:

*Follow the link for some examples of a variety of factors.
Teacher discretion required. Up to 2 marks awarded dependent on level of detail / explanation.*

FACTOR 4:

*Follow the link for some examples of a variety of factors.
Teacher discretion required. Up to 2 marks awarded dependent on level of detail / explanation.*

GAMES EQUIPMENT STORAGE UNIT

TO HELP YOU ANSWER THIS QUESTION Follow the link below.

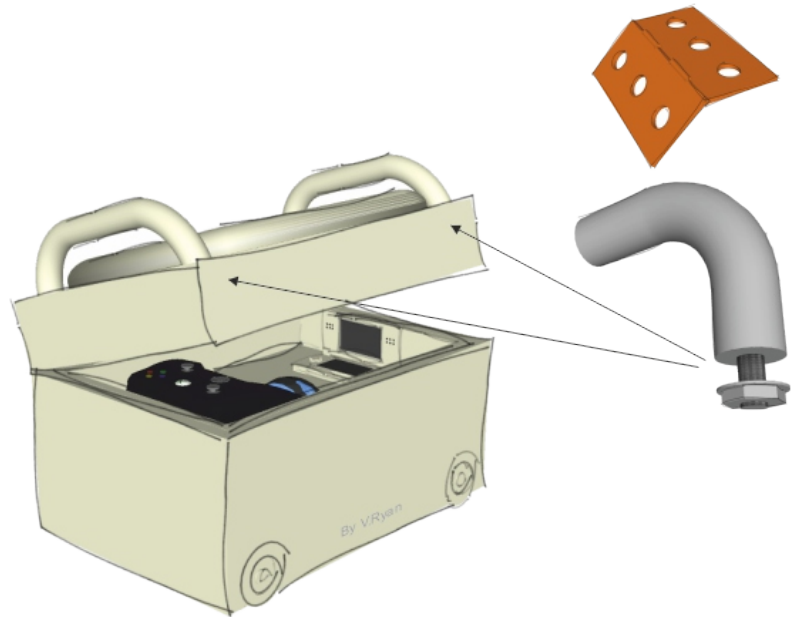
http://www.technologystudent.com/despro_fish/gamestore11.html

This page shows a storage unit for computer equipment. It is also a seat.

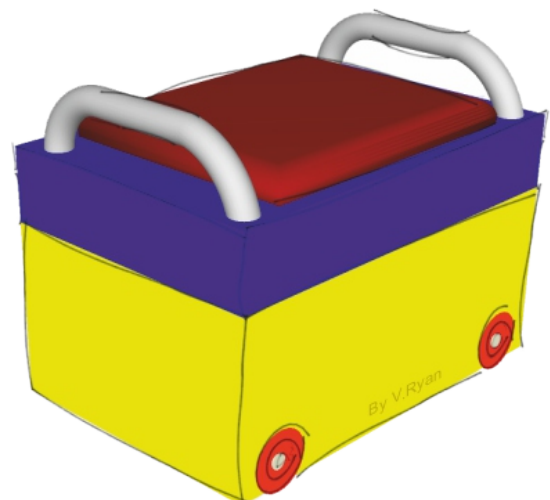
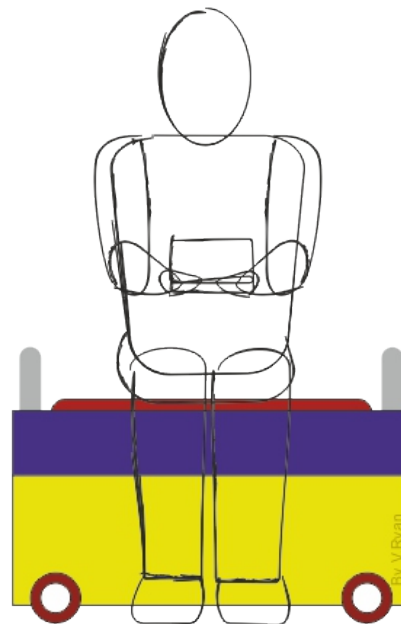
The lid opens to allow access to a number of trays that can be removed. The lid is lock-able.

The handles on the lid, are for lifting the lid and the entire unit, if required.

The small wheels are needed, when pushing the unit on the floor.



The question you are to answer is on the next page



TO HELP YOU ANSWER THIS QUESTION Follow the link below.

http://www.technologystudent.com/despro_fish/gamestore13.html

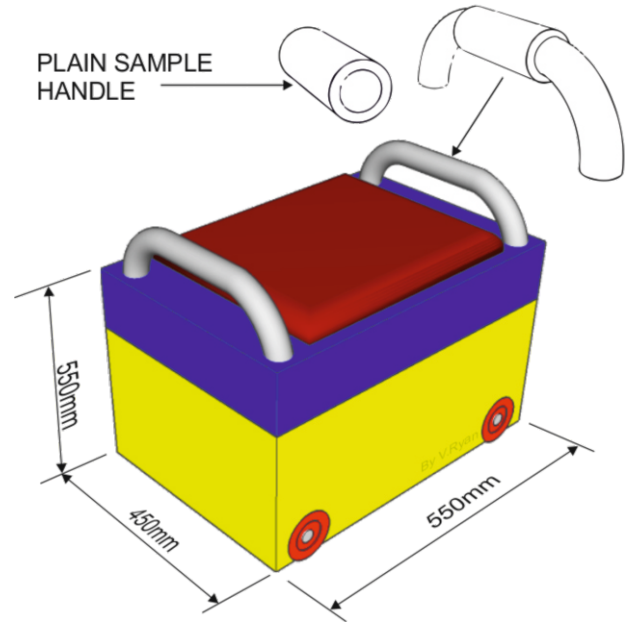
WORLD ASSOCIATION OF TECHNOLOGY TEACHERS

<https://www.facebook.com/groups/254963448192823/>

www.technologystudent.com © 2018 V.Ryan © 2018

26. In the space below, you are to design ONE of an identical pair of ergonomically shaped 'foam' handles, for the computer storage unit, that will slide onto the steel tube handles during manufacture. They will make lifting and moving the storage unit more comfortable.

A simple plain foam handle has been sketched opposite. The sketch shows the overall position and size of the 'ergonomic' handle, you are to design. 8 marks



1 to 2 marks for very basic attempt.

3 to 4 marks for both a sketch and notes - basic to reasonable notes

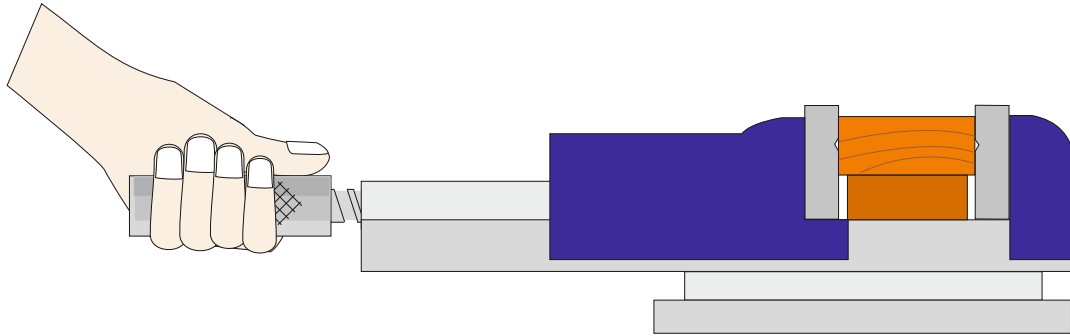
4 to 8 awarded for increased detail in form of sketch / sketches and notes and labels.

Follow the link for a sample answer.

27. A student is trying to work the ergonomic dimensions (measurements) for the 'round' handle of a machine vice, that he intends to manufacture. The student measures the radius of the handle of an existing handle and finds it to be 25mm.

What is the circumference of the handle? **3 marks**

What is the area of the 'round' end of the handle? **2 marks**



FORMULA

$$\text{AREA} = \pi r^2$$

$$\pi (\text{pi}) = 3.14$$

FORMULA

$$\text{CIRCUMFERENCE} = 2 \times \pi \times r$$

$$\pi (\text{pi}) = 3.14$$

Up to 2 marks for this answer.
Discretion regarding working out required and correct answer.

Up to 3 marks for this answer.
Discretion regarding working out required and correct answer.

| | RADIUS |
|----------|--------|
| HANDLE 1 | 20 |
| HANDLE 2 | 25 |
| HANDLE 3 | 24 |
| HANDLE 4 | 30 |
| HANDLE 5 | 28 |
| TOTAL | |
| AVERAGE | |

The student collects the radius measurements of five machine vices and enters the data into a table of results, seen opposite.

Calculate the average radius and enter your result in the table **3 marks**

Why could this measurement be useful when designing a new machine vice, based on the design above? **2 marks**

1 mark for Total
2 marks for average
2 marks for 'useful when designing a new machine vice...'

TO HELP YOU ANSWER THIS QUESTION Follow the link below.

<http://www.technologystudent.com/joints/photchrom1.html>

WORLD ASSOCIATION OF TECHNOLOGY TEACHERS

<https://www.facebook.com/groups/254963448192823/>

www.technologystudent.com © 2018 V.Ryan © 2018

28a. Designers need an understanding of smart materials. Photochromic inks have many practical applications. What are photochromic inks? 2 mark

*Up to 2 marks dependent on detail of answer.
Follow link for detailed answers*

28b. Describe two practical applications of photochromic inks. 2 x 3 marks

PRACTICAL APPLICATION 1:

*Follow link for sample answer.
1 mark for basic answer
2 marks for addition of some detail
3 marks for full detailed answer.*

PRACTICAL APPLICATION 1:

*Follow link for sample answer.
1 mark for basic answer
2 marks for addition of some detail
3 marks for full detailed answer.*

TO HELP YOU ANSWER THIS QUESTION

Follow the link below.

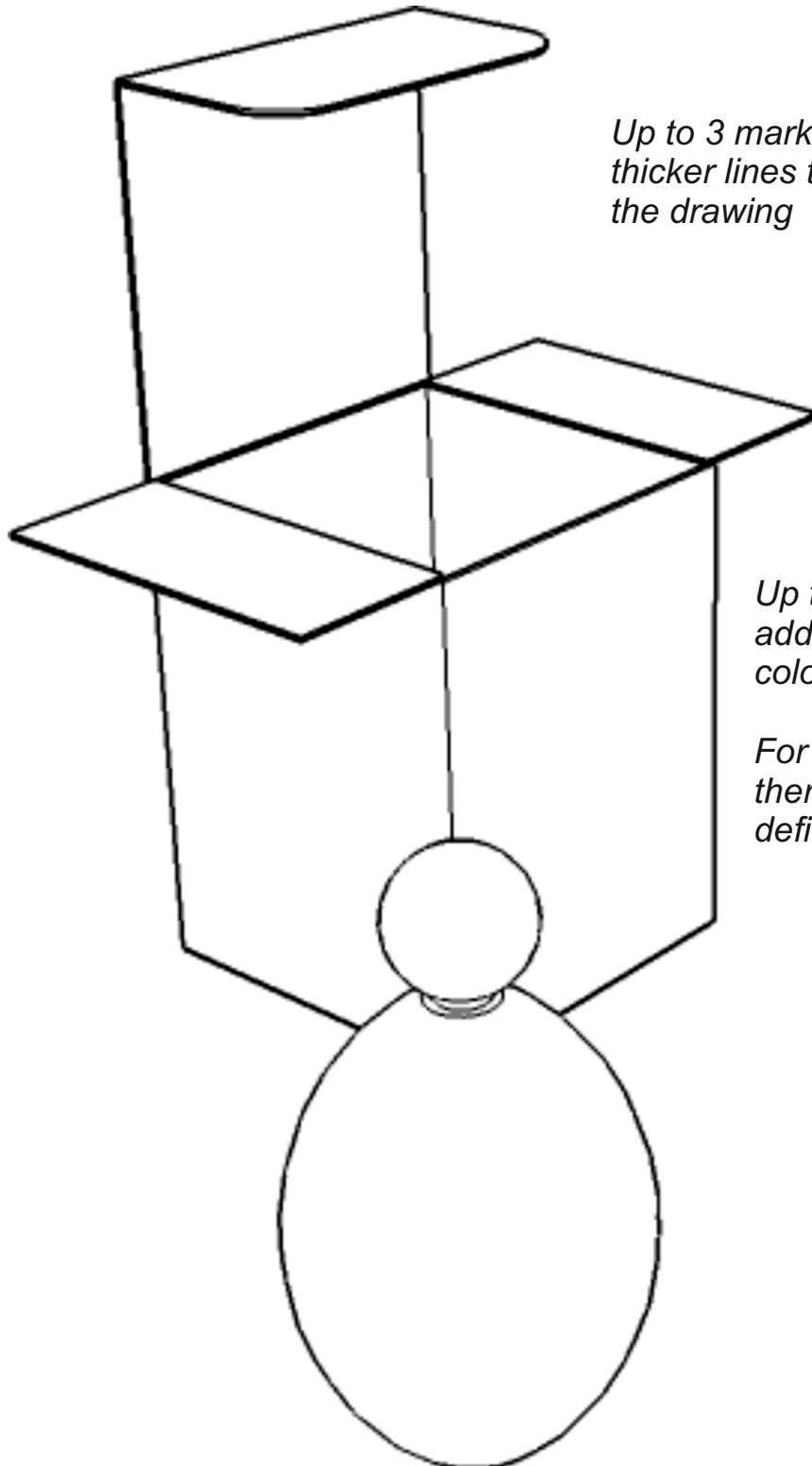
http://www.technologystudent.com/despro_flesh/thick2.html

30. Below is the packaging and bottle for perfume.

Using coloured pencils:

Select a suitable colour and add thick lines, to emphasise the outline of the bottle and its packaging. 3 marks

Add a series of thin coloured lines, to enhance the 3D effect. 6 marks



Up to 3 marks for adding thicker lines to the outline of the drawing

Up to 6 marks for adding effective coloured lines.

For 5 to 6 marks there must be a definite 3D effect.