G9 ECZ D&T 608/2 2014 SPECIMEN SOLUTIONS

Grade 9 ECZ Design and Technology 608/2 Paper 2 (Theory) 2014 Specimen

2 hours 30 minutes | Section A: MCQ | Section B: structured | Section C: compulsory + choice essay

9 D&T exam; the Graphic Communication paper (608/1, technical drawing) and the Major Project (608/3, coursework portfolio) are out of scope

EXAMINATIONS COUNCIL OF ZAMBIA

JUNIOR SECONDARY SCHOOL LEAVING EXAMINATION (GRADE 9) – 2014

DESIGN AND TECHNOLOGY 608/2
PAPER 2
(SPECIMEN)

(INTERNAL AND EXTERNAL CANDIDATES)

TIME: **2 hours 30 Minutes** **MARKS: 100**

Name of Candidate _____

Examination Number _____

School/Centre/Name _____ **Code**_____

INSTRUCTIONS TO CANDIDATES

1. Write your Name, Examination Number, School/Centre name and Code at the top of this page.
2. There are **three (3)** sections in this question paper, Section **A**, **B** and **C**.
3. Answer all questions from Section **A** and Section **B**, and choose any **two (2)** questions from Section **C**.
4. In Section **A** answer all questions on the answer sheet provided. Choose the best answer from A, B, C or D. Mark the letter of the answer that you have chosen with a cross (X)
5. In Section **B**, write your answers on the spaces provided in the question paper.
6. In Section **C**, write all your answers on the blank pages 14 and 15 provided at the end of the question paper.

INFORMATION FOR CANDIDATES

Cell phones are not allowed in the examination room.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

 This paper consists of 15 printed pages and an Answer booklet.

Section A

Answer all questions in this section. Choose the best answer from A, B, C or D. Mark the letter of the answer that you have chosen with a cross (X)

1				2				3				4			
A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D

5				6				7				8			
A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D

9				10				11				12			
A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D

13				14				15				16			
A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D

17				18				19				20			
A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D

21				22				23				24			
A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D

25				26				27				28			
A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D

29				30			
A	B	C	D	A	B	C	D

Section A

Multiple choice questions

Answer all questions from this section. Write all your answers in the Answer Booklet provided. Cross out the best answer from the four (4) choices that are given A, B, C, and D with the letter X.

1 Some conductors are covered with plastic materials, in this case the plastic acts as • • •

A an insulator.
B a conductor.
C a decoration.
D a resisitor.

2 The safe way to give a chisel to a friend is by letting your friend receive it with • • •

A handle first.
B blade first.
C both hands.
D head first.

3 To treat a dirty bleeding cut, you must • • •

A wipe off the blood, apply cream and cover with plaster.
B wipe off the blood, apply vaseline and cover with plaster.
C wash with running water, wipe dry and cover with plaster.
D wash with hot water, wipe dry, apply vaseline and cover.

4 When applying paint on an artefact, it is advisable that it must be done in a well ventilated environment. Why is this practice advised?

A To show everybody the beauty of your work.
B To clean the work place easily when you finish.
C To avoid suffocation while working.
D To control the amount of paint used.

5 Which material below is not environmental friendly?

A Metals
B Wood
C Plastics
D Paper

6 A trapezium has • • • sides.

A 3
B 4
C 5
D 6

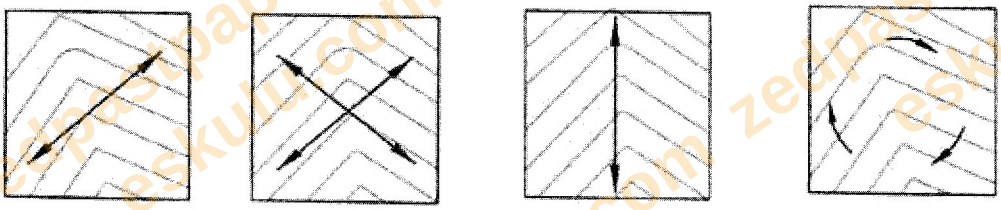
7 Plastics can be categorised into two groups, namely • • •

A ferrous and non-ferrous.
B thermo setting and a petroleum jelly.
C petroleum and thermoplastics.
D thermo plastics and thermo-setting.

8 Which tool below cuts materials by shearing?

A Pair of scissors
B Chisel
C Scraper
D Panel saw

9 Which of the following shows the correct method of using a glasspaper?



A **B** **C** **D**

FIGURE 1

10 Which of the labelled parts represents a chord?

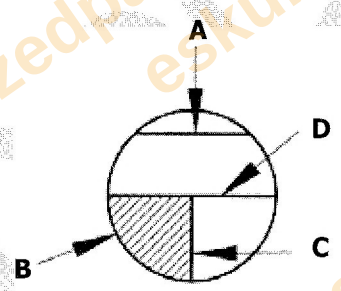


FIGURE 2

11 The diagram below is showing two materials. One is made of wood and the other of acrylic plastic.

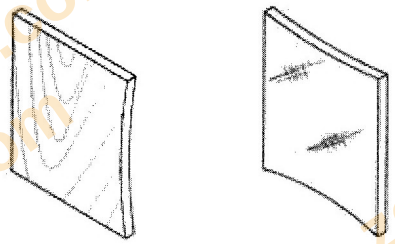
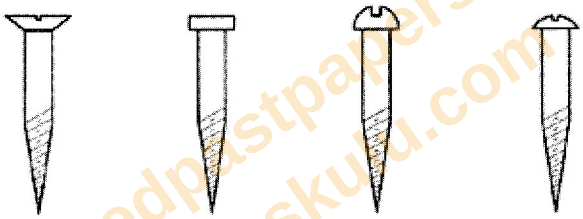


Figure 3

Name one type of glue that would be used to laminate them

A Polyvingl Acetate (PVA)
B Animal glue
C Varnish
D Contact glue

12 Which of the following is a round head screw. • • •



A **B** **C** **D**

13 The boxes below show some symbols used in electrical circuits.

1 **2** **3** **4**

Pick the symbol that represents a light bulb.

A 1
B 2
C 3
D 4

14 Which of the blocks below is represented by the orthographic presentation shown?

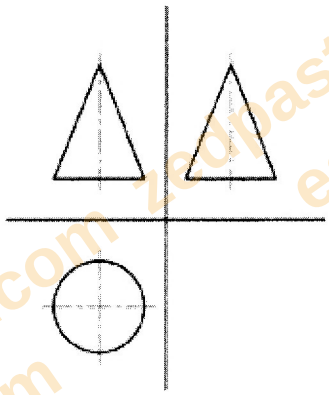
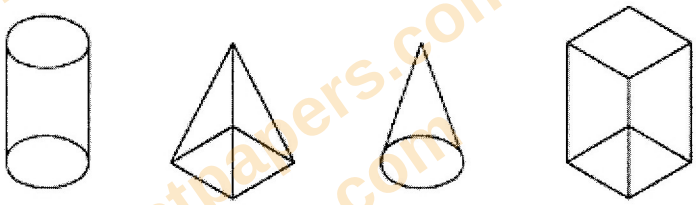


Figure 6



A **B** **C** **D**

Use the Figure 7 below to answer question 15, 16 and 17.

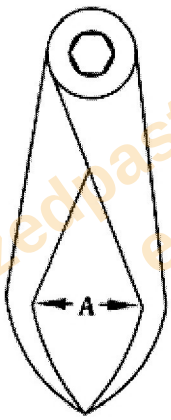


Figure 7

15 Name the tool above.

A Vernier callipers
B Wing callipers
C Old leg callipers
D Outside callipers

16 State the use for the tool above.

A Testing outside diameters
B Testing thickness of metal plates
C Lifting small pins from corners of boxes
D Checking for errors inside a work piece.

17 Name the parts labelled (A) in the diagram above.

A Arms
B Frames
C Legs
D Wings

18 The sketch below shows a • • •

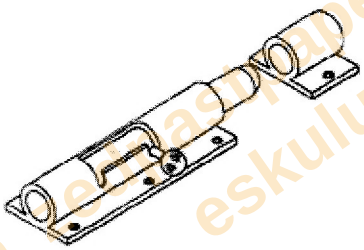


Figure 8

A hasp and staple.
B cupbord lock.
C barrel bolt.
D butt hinge.

19 At what stage in the design process, do you estimate the cost of the product?

A Design brief
B Specifications
C Possible solutions
D Evaluation

20 Which of the following has potential energy?

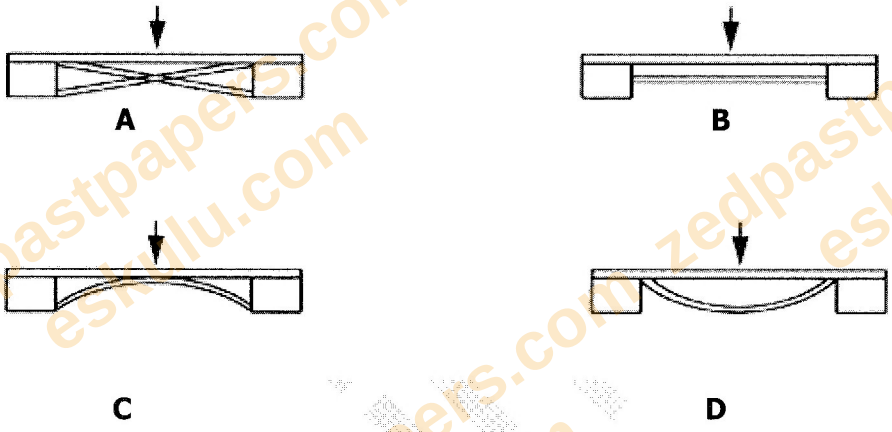
A Spring
B Radio
C Kettle

D Spade

21 Marketing of a product means that you are • • •

A presenting facts about your product to the buyers.
B presenting the advantages of your products to the buyers.
C indicating the weaknesses of your product for your product.
D looking at the needs of your buyers for your product.

22 Which of the following is the most rigid structure?



23 The name given to the line OX in the diagram below is called • • •

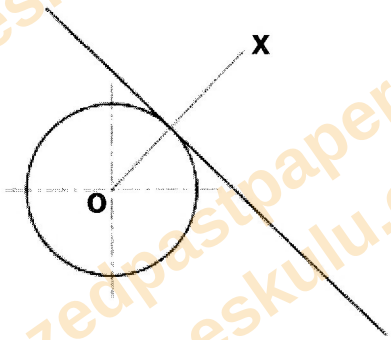


Figure 10

A radius.
B tangent.
C normal.
D chord.

24 The figure below shows a coffee table top. The arrangement of linees forms a ...

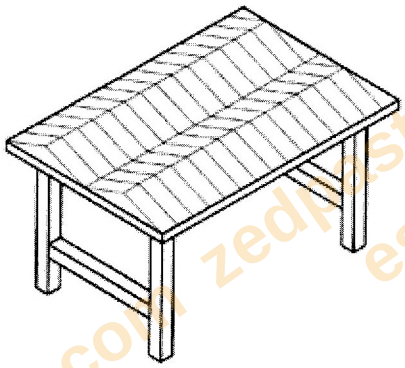


Figure 11

A pattern.
B design.
C fashion.
D series.

25 What is the best finish to apply on artefact that is made of mild still which will be used outdoor?

A Oil
B Varnish
C Gloss paint
D Water paint

26 Which of the following heat treatments increases the hardness and brittleness of a tool?

A Tempering
B Forging
C Hardening
D Annealing

27 The figure below shows gear movement. The arrow in gear A shows its direction of movement. Which direction will gear C move?

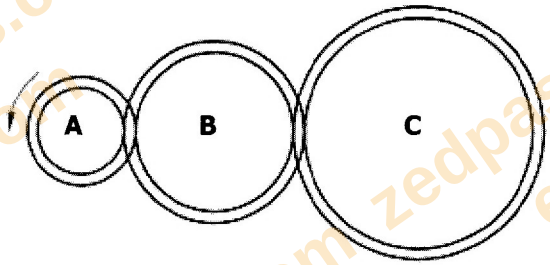


Figure 12

A Clockwise
B Reverse
C Oscillating
D Anticlockwise

28 What is the importance of the main circuit breaker (MCB) in the electrical installation of a house?

A It produces circuits for house devices.
B It cuts off power in case of an over load.
C It helps maintain power in case of load shedding.
D It is a monitoring device

Study the symbol below.

Figure 13

29 What does the symbol above represent?

A Children crossing the road ahead.
B Clinic is near the road.
C Dancing arena is nearby.
D Bus stop ahead.

30 Only one tool below is used on wood, which one is it?

A Hacksaw
B Centre punch
C Engineer's square
D Tenon saw

[Total 30 marks]

Section B

Attempt all questions

Write your answers on the spaces provided.

31 (a) The diagram in Figure 14 shows a marking tool that is used both in woodwork and metal work.

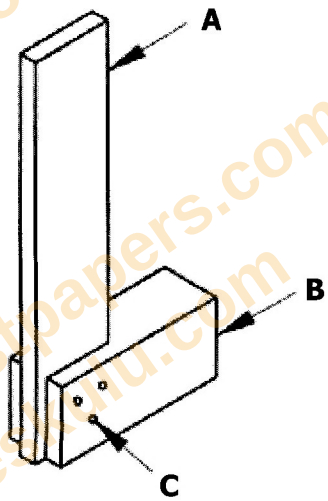


Figure 14

(i) Name the tool _____ [1]

(ii) Name the parts: **A** _____ [1]

B _____ [1]

C _____ [1]

(iii) What materail is used for making: [1]

a. the blade_____ [1]

b. if this tool is meant to be used in metalwork what special name is it given? _____ [1]

c. the tool is used for _____

_____ [1]

(b) **(i)** Ferrous metals contain _____ while a metal made by combining two or more metallic elements is called _____ [1]

(ii) If a cross section of a tree is likened to a bicycle wheel what part will the spokes represent? _____ [1]

(iii) A purposeful collection of student work that shows his/her efforts progress and achievements in Design process is called _____ [1]

(iv) A means of representing a three dimensional object in two dimensions is known as _____ [1]

(v) A chisel with two ferrules is called _____ [1]

(c) **(i)** The three methods of nailing are:

a. _____ [1]

b. _____ [1]

c. _____ [1]

(ii) Another name for mild steel is _____ [1]

(iii) Name four types of hammers

a. _____ [1]

b. _____ [1]

c. _____ [1]

d. _____ [1]

Section C

Answer question 32 as a compIsory question and any other one from questions 33, 34 and 35. All questions in this section will be answered on the blank pages 14 and 15 provided at the end of the question paper.

32 **(a)** In free hand, draw an isometric pictorial sketch of a pop riveting gun. [4]

(b) Label two parts on your sketch. [2]

(c) Explain how it is used /operated. [6]

(d) Name four other solid rivets. [4]

(e) Name and draw one tool that is used when fixing solid rivets. [2]

(f) Label two parts of the tool you have drawn for question 32 (e). [2]

33 You have been asked to design a pen/pencil holder which can hold 6 pens/pencils.

(a) Sketch two design solutions for this holder. [8]

(b) Give four (4) factors which would influence your design with reference to the selection of your materials. [4]

(c) State two important reasons for the selection of your size. [2]

(d) What safety features are provided for in your design. [6]

34 **(a)** By means of a free hand sketch, draw the air-seasoning of timber. [3]

(b) Label five major parts of this structure. [5]

(c) Give four factors that would influence selection of this site. [4]

(d) State four advantages and four disadvantages of this method. [8]

35 Plastic are non-metal materials that are fast superseding metal and wood in the manufacture of household and other items.

(a) Mention two items in a home situation that could be made of plastics. [1]

(b) Write two materials used to make plastics. [1]

(c) Write five advantages of using plastic as compared to metal. [5]

(d) Write five disadvantages of using plastic as compared to metal. [5]

(e) Explain briefly how you can make any plastic toy of your choice. Outline the four major stages with sketches and tools used. [8]

Question 1. Some conductors are covered with plastic materials. In this case the plastic acts as ... (A) an insulator (B) a conductor (C) a decoration (D) a resistor

Answer: A -- plastic covering on a conductor acts as an insulator.

Question 2. The safe way to give a chisel to a friend is by letting your friend receive it with the ... (A) handle first (B) blade first (C) both hands (D) head first

Answer: A -- a chisel should be handed over handle first, keeping the sharp blade pointed away from both people.

Question 3. To treat a dirty bleeding cut, you must ... (A) wipe off the blood, apply cream and cover with plaster (B) wipe off the blood, apply vaseline and cover with plaster (C) wash with running water, wipe dry and cover with plaster (D) wash with hot water, wipe dry, apply vaseline and cover

Answer: C -- a dirty cut should first be washed clean with running water, dried, then covered with a plaster.

Question 4. When applying paint on an artefact, it is advisable that it must be done in a well ventilated environment. Why is this practice advised? (A) To show everybody the beauty of your work (B) To clean the work place easily when you finish (C) To avoid suffocation while working (D) To control the amount of paint used

Answer: C -- good ventilation prevents the painter from inhaling fumes and suffocating while working.

Question 5. Which material below is not environmentally friendly? (A) Metals (B) Wood (C) Plastics (D) Paper

Answer: C -- plastics are not biodegradable and are the least environmentally friendly of the options.

Question 6. A trapezium has ... sides. (A) 3 (B) 4 (C) 5 (D) 6

Answer: B -- a trapezium has 4 sides.

Question 7. Plastics can be categorised into two groups, namely ... (A) ferrous and non-ferrous (B) thermo setting and a petroleum jelly (C) petroleum and thermoplastics (D) thermo plastics and thermo-setting

Answer: D -- plastics are categorised into thermoplastics and thermosetting plastics.

Question 8. Which tool below cuts materials by shearing? (A) Pair of scissors (B) Chisel (C) Scraper (D) Panel saw

Answer: A -- a pair of scissors cuts material by a shearing action between two blades.

Question 9. Which of the following shows the correct method of using a glasspaper? [Figure 1: four diagrams of glasspaper rubbing directions -- straight, diagonal-cross, straight-vertical, curved]

Answer: The correct method is to rub the glasspaper in a straight line, with the grain of the wood, not in circular or crossing strokes -- the option showing a single straight rubbing direction along the grain is correct.

Question 10. Which of the labelled parts represents a chord? [Figure 2: circle with parts labelled A, B, C, D]

Answer: The chord is the straight line joining two points on the circle's circumference without passing through the centre -- identified by the label positioned on that straight line across the circle (not the radius, not the segment shading).

Question 11. The diagram below is showing two materials. One is made of wood and the other of acrylic plastic. Name one type of glue that would be used to laminate them. (A) Polyvinyl Acetate (PVA) (B) Animal glue (C) Varnish (D) Contact glue

Answer: D -- Contact glue/adhesive is used to laminate/bond dissimilar materials such as wood and acrylic plastic.

Question 12. Which of the following is a round head screw? [Figure: four screw-head profiles A-D]

Answer: The round head screw is the one whose head forms a smooth, rounded dome shape above the shank (as opposed to the countersunk, raised-countersunk, or flat-head profiles shown for the other options).

Question 13. The boxes below show some symbols used in electrical circuits. Pick the symbol that represents a light bulb.

Answer: The circuit symbol showing a circle with a cross or filament mark inside represents a light bulb.

Question 14. Which of the blocks below is represented by the orthographic presentation shown? [Figure 6: two triangle views over a circle view; options A-D show a cylinder, a pyramid, a cone, a hexagonal prism]

Answer: C -- a cone, since its front and side elevations are both triangles and its plan view is a circle, matching the given orthographic views.

Question 15. Name the tool above. [Figure 7: a caliper-type tool] (A) Vernier callipers (B) Wing callipers (C) Old leg callipers (D) Outside callipers

Answer: D -- the tool shown, with curved legs for measuring an object's external width, is the Outside callipers.

Question 16. State the use for the tool above. (A) Testing outside diameters (B) Testing thickness of metal plates (C) Lifting small pins from corners of boxes (D) Checking for errors inside a work piece

Answer: A -- outside callipers are used for testing/measuring outside diameters and widths.

Question 17. Name the parts labelled (A) in the diagram above. (A) Arms (B) Frames (C) Legs (D) Wings

Answer: C -- the labelled part A, the pointed measuring ends of the callipers, are called the legs.

Question 18. The sketch below shows a ... (A) hasp and staple (B) cupboard lock (C) barrel bolt (D) butt hinge

Answer: C -- the sliding cylindrical bolt mechanism shown is a barrel bolt.

Question 19. At what stage in the design process do you estimate the cost of the product? (A) Design brief (B) Specifications (C) Possible solutions (D) Evaluation

Answer: B -- cost is one of the constraints set out at the Specifications stage.

Question 20. Which of the following has potential energy? (A) Spring (B) Radio (C) Kettle (D) Spade

Answer: A -- a compressed or stretched spring stores potential (elastic) energy.

Question 21. Marketing of a product means that you are ... (A) presenting facts about your product to the buyers (B) presenting the advantages of your products to the buyers (C) indicating the weaknesses of your product for your product (D) looking at the needs of your buyers for your product

Answer: D -- marketing means identifying and looking at the needs of your buyers/customers for your product.

Question 22. Which of the following is the most rigid structure? [Figure 9: four beam-under-load diagrams A-D, showing a cross-braced beam, a plain beam, a sagging beam, and a doubly-sagging beam]

Answer: A -- the beam reinforced with a diagonal cross-brace is the most rigid, since triangulated bracing resists bending/deformation best.

Question 23. The name given to the line OX in the diagram below is called a ... (A) radius (B) tangent (C) normal (D) chord

Answer: B -- a straight line touching the circle at one point (as OX is drawn) is a tangent.

Question 24. The figure below shows a coffee table top. The arrangement of lines forms a ... (A) pattern (B) design (C) fashion (D) series

Answer: A -- a repeated, structured arrangement of lines like this forms a pattern.

Question 25. What is the best finish to apply on an artefact that is made of mild steel which will be used outdoor? (A) Oil (B) Varnish (C) Gloss paint (D) Water paint

Answer: C -- gloss paint gives mild steel a durable, weatherproof protective finish suitable for outdoor use.

Question 26. Which of the following heat treatments increases the hardness and brittleness of a tool? (A) Tempering (B) Forging (C) Hardening (D) Annealing

Answer: C -- hardening increases a tool's hardness and brittleness.

Question 27. The figure below shows gear movement. The arrow in gear A shows its direction of movement. Which direction will gear C move? (A) Clockwise (B) Reverse (C) Oscillating (D) Anticlockwise

Answer: A -- with three meshed gears in a row, gear B reverses gear A's direction and gear C reverses it again, so gear C turns the same direction as gear A (Clockwise).

Question 28. What is the importance of the main circuit breaker (MCB) in the electrical installation of a house? (A) It produces circuits for house devices (B) It cuts off power in case of an overload (C) It helps maintain power in case of load shedding (D) It is a monitoring device

Answer: B -- the MCB automatically cuts off power to protect the circuit in case of an overload.

Question 29. Study the symbol below (two stick figures on a post). What does the symbol above represent? (A) Children crossing the road ahead (B) Clinic is near the road (C) Dancing arena is nearby (D) Bus stop ahead

Answer: A -- the pedestrian figures on a road sign post represent Children crossing the road ahead.

Question 30. Only one tool below is used on wood, which one is it? (A) Hacksaw (B) Centre punch (C) Engineer's square (D) Tenon saw

Answer: D -- the Tenon saw is used for cutting wood; the others are metalwork tools.

Question Section B - Q1. The diagram in Figure 14 shows a marking-out tool used in both woodwork and metal work, with parts labelled A (blade), B (stock), C (a locking screw). (a)(i) Name the tool. (ii) Name parts A, B, C. (iii) What material is used for making the blade, and what special name is given to this tool when used in metalwork, and what is the tool used for? (b)(i) Ferrous metals contain ... while a metal made by combining two or more metallic elements is called ... (ii) If a cross section of a tree is likened to a bicycle wheel, what part will the spokes represent? (iii) A purposeful collection of student work that shows his/her efforts, progress and achievements in the design process is called ... (iv) A means of representing a three dimensional object in two dimensions is known as ... (v) A chisel with two ferrules is called ... (c)(i) Name the three methods of nailing. (ii) Another name for mild steel is ... (iii) Name four types of hammers.

(a)(i)

Answer: A try-square (marking/testing square).

(a)(ii)

Answer: A - the blade; B - the stock (the thicker handle/base piece the blade is fixed into); C - the locking rivets/screw fixing the blade to the stock.

(a)(iii)

Answer: The blade is made of steel (hardened/tempered steel); when used in metalwork this tool is called an engineer's square; it is used for marking and testing right angles (90 degrees) on a workpiece.

(b)(i)

Answer: Ferrous metals contain iron; a metal made by combining two or more metallic elements is called an alloy.

(b)(ii)

Answer: The spokes represent the medullary rays of the tree.

(b)(iii)

Answer: A portfolio.

(b)(iv)

Answer: Orthographic projection (technical/engineering drawing).

(b)(v)

Answer: A firmer chisel (double-ferruled/registered chisel).

(c)(i)

Answer: Three methods of nailing: (a) nailing straight/in-line, (b) dovetail nailing (nails driven in at opposing angles), (c) skew nailing/toe nailing (nails driven in at an angle through the face into the adjoining piece).

(c)(ii)

Answer: Plain carbon steel (low-carbon steel).

(c)(iii)

Answer: Four types of hammers: (a) claw hammer, (b) ball-pein (ball-peen) hammer, (c) mallet, (d) sledge hammer.

Question Section C - Q32. (a) In free hand, draw an isometric pictorial sketch of a pop riveting gun. [4] (b) Label two parts on your sketch. [2] (c) Explain how it is used/operated. [6] (d) Name four other solid rivets. [4] (e) Name and draw one tool that is used when fixing solid rivets. [2] (f) Label two parts of the tool you have drawn for question 32(e). [2]

(a)

NOT DRAWABLE IN THIS FORMAT -- this sub-part requires an actual freehand isometric sketch. Description of what the sketch should show: a pistol-shaped riveting gun -- a handle/grip with a trigger, a barrel/nose piece at the front that holds the rivet mandrel, and a set of jaws inside the nose that grip and pull the mandrel when the trigger is squeezed.

(b)

Answer: Two parts to label: the trigger (handle) and the nose piece (jaws).

(c)

Answer: How a pop riveting gun is used/operated: the rivet (with its mandrel/pin through the centre) is pushed into the pre-drilled hole through both pieces of material to be joined; the nose piece of the gun is fitted over the protruding mandrel; the trigger is then squeezed repeatedly, which pulls the mandrel through the rivet body, causing the rivet's rear end to expand/flare out and clamp the two materials tightly together; once the mandrel snaps off at its weak point (once the set force is reached), the rivet is complete and the broken-off mandrel stub is discarded.

(d)

Answer: Four other solid rivets: (i) round head (snap head) rivet, (ii) countersunk head rivet, (iii) flat head rivet, (iv) pan head rivet.

(e)

Answer: A rivet set (snap head tool) is used when fixing solid rivets.

(f)

NOT DRAWABLE IN THIS FORMAT -- this sub-part requires an actual freehand sketch of the rivet set. Description: a rivet set is a short steel bar with a hollow, shaped cup (dolly) at the working end and a flat striking face at the other end for the hammer -- the two parts to label are the cupped/dolly end (which shapes the rivet head) and the striking (hammer) end.

Question Section C - Q33. You have been asked to design a pen/pencil holder which can hold 6 pens/pencils. (a) Sketch two design solutions for this holder. [8] (b) Give four factors which would influence your design with reference to the selection of your materials. [4] (c) State two important reasons for the selection of your size. [2] (d) What safety features are provided for in your design? [6]

(a)

NOT DRAWABLE IN THIS FORMAT -- this sub-part requires two freehand design sketches. Description of two possible design solutions: Design 1 -- a simple cylindrical holder (e.g. a hollowed wooden or plastic tube standing upright, wide/heavy base for stability, open top); Design 2 -- a rectangular block holder with 6 individual drilled/bored holes arranged in a row or grid, each sized to snugly hold one pen/pencil upright.

(b)

Answer: Four factors influencing material selection: (i) strength/durability of the material, (ii) cost of the material, (iii) availability of the material, (iv) appearance/finish (aesthetic quality) of the material.

(c)

Answer: Two reasons for the selection of size: (i) the holder must be large/stable enough to hold all 6 pens/pencils securely without tipping over, (ii) the holder should be a convenient, compact size for use on a desk without taking up too much space.

(d)

Answer: Safety features provided for in the design: no sharp edges or corners (all edges rounded/sanded smooth); a stable, wide base so it cannot easily topple over; smooth, splinter-free internal surfaces at the pen/pencil openings so users are not cut or pricked when inserting or removing items.

Question Section C - Q34. (a) By means of a free hand sketch, draw the air-seasoning of timber. [3] (b) Label five major parts of this structure. [5] (c) Give four factors that would influence selection of this site. [4] (d) State four advantages and four disadvantages of this method. [8]

(a)

NOT DRAWABLE IN THIS FORMAT -- this sub-part requires a freehand sketch. Description: a stack of sawn timber planks laid in horizontal layers on a raised concrete/brick foundation, with narrow wooden spacer strips (stickers) placed between each layer of planks to allow air to circulate, the whole stack covered by a sloped roof to keep off rain while leaving the sides open to the air.

(b)

Answer: Five major parts to label: (i) the foundation/base (piers), (ii) the timber planks/boards being seasoned, (iii) the spacer strips (stickers) between layers, (iv) the protective roof/cover, (v) the open sides allowing air circulation.

(c)

Answer: Four factors influencing site selection for air-seasoning: (i) good air circulation/ventilation at the site, (ii) a well-drained, dry site away from dampness/standing water, (iii) protection from direct rain (a sheltered/covered area), (iv) a level, firm site that can support the weight of the stacked timber.

(d)

Answer: Four advantages: (i) low cost, since no special equipment/fuel is needed, (ii) simple method requiring little skill, (iii) reduces the risk of over-drying/splitting caused by fast artificial drying, (iv) environmentally friendly, using no energy input. Four disadvantages: (i) it is a slow process, taking months or years to properly season timber, (ii) it depends heavily on weather/climate conditions, (iii) it cannot dry timber below the surrounding atmospheric moisture level, (iv) the timber remains exposed to attack by fungi, insects, and moisture during the long seasoning period.

Question Section C - Q35. Plastics are non-metal materials that are fast superseding metal and wood in the manufacture of household and other items. (a) Mention two items in a home situation that could be made of plastics. [1] (b) Write two materials used to make plastics. [1] (c) Write five advantages of using plastic as compared to metal. [5] (d) Write five disadvantages of using plastic as compared to metal. [5] (e) Explain briefly how you can make any plastic toy of your choice. Outline the four major stages with sketches and tools used. [8]

(a)

Answer: Two household items made of plastic: buckets and plastic chairs.

(b)

Answer: Two materials used to make plastics: crude oil (petroleum) and natural gas.

(c)

Answer: Five advantages of plastic over metal: (i) plastic is lighter in weight, (ii) plastic does not rust/corrode, (iii) plastic is generally cheaper to produce, (iv) plastic is a good electrical insulator, (v) plastic can be moulded into complex shapes more easily.

(d)

Answer: Five disadvantages of plastic compared to metal: (i) plastic is generally weaker/less strong than metal, (ii) plastic is not biodegradable and pollutes the environment, (iii) plastic can melt or deform under heat, (iv) plastic is more prone to cracking when it becomes brittle with age, (v) plastic cannot be welded/joined as strongly as metal.

(e)

The four major stages, described in text (sketches not reproducible in this format): (1) Design/planning -- sketch the toy's shape and decide on the mould needed; (2) Heating -- the plastic (e.g. a sheet or granules) is heated until it becomes soft/pliable, using tools such as a strip heater or oven; (3) Forming/moulding -- the softened plastic is pressed, blown, or vacuum-formed into a mould using tools such as a vacuum-forming machine or a simple wooden/plaster mould and a former; (4) Finishing -- the formed toy is trimmed of excess plastic (using a scriber/knife or fret saw), and edges are smoothed with a file or glasspaper.

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