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Unit Standard **30475**

PRACTICE PAPER - ANSWER BANK

Assessors Note:
This answer bank should be used as the primary resource when marking students work. However, responses to some questions may be subjective and tutors are advised to exercise their professional judgement when making assessment decisions.

ELEMENT ONE
Demonstrate knowledge of metals and composite materials commonly used in the motor industry.

1. Complete the table by providing an automotive use for each of the following non-ferrous metals and a reason why the metal is used.

	USE	REASON
Aluminium	Rocker cover, wheel rims	Used as it is light, soft, malleable and ductile. It resists corrosion and is a good conductor of heat.
Copper	Electrical wiring, pipes and radiators	Used as it is malleable, ductile and is a good conductor of heat and electricity.
Lead	Batteries, wheel balance weights	Used as it is soft, heavy, malleable and highly plastic.
Solder	Used to join metals together and for making electrical connections	Used as is has a low melting point and is a good conductor of electricity. It is also less likely to cause heat damage
Brass	Filler rod in welding/ electrical terminals	Used as it very versatile, different combinations of Zinc and Copper produce brass with different characteristics
Bronze	Bushing and thrust washers	Used as it resists corrosion and rusting and is a good conductors of heat and electricity
Chromium	Bumpers/grills/wheels	Used as it resists corrosion and provides an attractive finish

2. Complete the table by providing an automotive use for each of the following ferrous metals and a reason why the metal is used.

	USE	REASON
Mild steel	Body panels and parts that are not load bearing	Can be easily shaped and welded, is soft and ductile
High tensile steel	Chassis rails, front and rear impact frames and body panels	Used as it is relatively light but is strong. It is also cheap to manufacture.
Spring steel	Coil and leaf springs	Used as it is relatively hard and strong.
Stainless steel	Exhaust system components, some body parts	Used as it is rust resistant and hard wearing.
Cast iron	Cylinder blocks, cylinder heads and other housings	Used as it is very rigid and strong in compression. Can be cast into intricate shapes and forms a good wearing surface.
Medium carbon steel	Crankshafts, connecting rods, gears and camshafts	Used as is strong and be forged**.**
High carbon steel	Cutting tools, files, taps, dies and punches	Used as it is hard and strong

3. Complete the table by providing an automotive use for each of the following plastics.

	USE
ABS	Grilles, body panels, instrument panels
PE - Polyethylene	Interior trim
TPUR	Upholstery
Acrylic	Light lenses and covers
Polyamide or Nylon	Exterior trim, radiator tanks, gears
Polystyrene (PS)	Sound deadening and seat filler

4. Complete the table for each of the following heat treatments by providing a reason why it is carried out and brief explanation of how it is carried out.

	Why is it carried out?	How is it carried out?
Hardening	Carried out to increase resistance to penetration.	Steel is heated and quenched in water or oil
Case hardening	Introduces carbon into the surface of the metal.	The parts to be hardened are heated to around 900°C and then put in contact with a carbon material in a heated firebox. The parts are then reheated and quenched.
Tempering	Carried out to remove brittleness.	Process of heating steel to 230°C-300°C and then quenching
Annealing	Carried out to soften steel so that it becomes easier to work.	Steel is heated and then cooled very slowly.
Normalising	Carried out to return steel to its original standard.	Steel is heated and then cooled in still air..

ELEMENT TWO
Demonstrate knowledge of assembling and securing components.

1. Provide a brief description of each of the following methods of securing components:

Bonding Components joined together using chemical adhesives

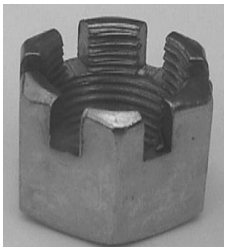
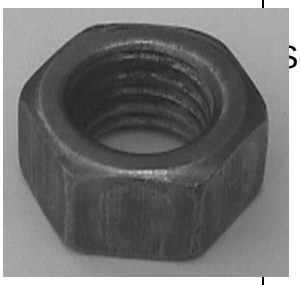
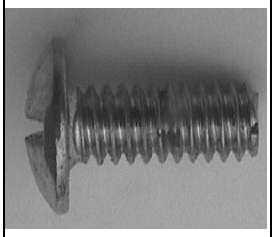
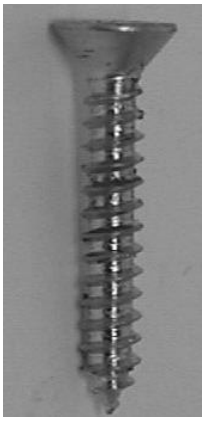
Mechanical Components are clamped together using fasteners

Welding Two metals are fused together using heat

2. Complete the table by providing an automotive use for each of the following fasteners.

	USE
Cable ties	Can be used when securing wiring harnesses, steering rack boots and wheel covers
Clamps	To secure exhaust pipes and radiator hoes
Double sided tape	Can be used when securing exterior protective mouldings, decals and badges.
Lockwire	To secure c.v. boots and rack and pinion boots
Studs	Use to securely clamp components together

3. Complete the table by identifying the fasteners.

Castellated nut		Nylock nut	
Wing nut		Machine screw	
Hexagonal plain nut		Self-tapping screw	
Speed nut		Countersunk head	

4. What are pop rivets and describe how they are used.

A pop rivet is a hollow tubular rivet that is assembled to a steel mandrel. It used in conjunction with a pop rivet gun to secure two pieces of metal together.

Each rivet has a shank, which passes through the rivet from one side and emerges through the head.

When the pop rivet tool is operated, the shank is pulled into the tool, forming the head on the other end.

At a predetermined tension, the shank snaps off, leaving the rivet in position.

What is the main advantage of using this type of fastening system?

It is the quick and easy method of fixing materials together when only one side of the material is accessible.

5. What are mechanical locking devices?

Mechanical locking devices are often used to ensure that fasteners remain secure. They are commonly constructed using high strength spring steel and are designed to crush when secured between the work and the fastener.

6. What are chemical locking compounds?

A number of types of chemical thread locking compounds are used to ensure that nuts and bolts remain secure.

ELEMENT THREE
Demonstrate knowledge of drilling holes in materials.

1. List two types of drilling tools that can be used to drill a hole.

Drill press
Air drill
Battery operated drill
Electric drill

2. List three factors to be considered before drilling a hole in a component.

1. The size of the drill bit
2. The need for a pilot hole
3. The cutting speed to suit the material
4. The need for lubricant to suit the material
5. The drill angles

3. List four factors to be considered when selecting a twist drill.

1 Diameter of the drill
2 Length of the twist drill
3 Type of cutting tip
4 Material to be drilled

4. Explain why the trailing edge of the twist drill lip must be lower than the leading edge.

To provide clearance for the cutting edge

5. List three reasons why cutting fluid is used when drilling.

Acts as a coolant
Acts as a lubricant
Will improve the cutting finish

6. Explain why it is important to refer to the manufacturer's charts when drilling a hole for tapping.

Manufacturers provide tap and drill size charts to enable technicians to select the appropriate drill size to form the tapping hole and the appropriate tap to form the thread

7. Explain why it is important to check the twist drill is correctly sharpened before use.

To ensure that maximum cutting performance is achieved.

8. Describe the procedure involved when sharpening a twist drill.

Install a fine grade wheel on the grinder.
Switch on the grinding wheel.
Holding the drill bit firmly, place the drill bit against the tool rest at the correct angle.
Applying light pressure offer the drill bit cutting edge to the grinding wheel.
Twist the drill bit to form the cutting edge clearance.
Repeat this procedure for the second cutting edge.
Cool the bit and check both cutting edge angles on a drill angle gauge.

9. List three outcomes that should be avoided when drilling a hole.

A rough hole
An oversize bore
A split drill web
Damaged corners
Drill breakage

10. State a safety precaution that must be observed when using drilling equipment to protect your personal safety.

Long hair is tied back
Wear appropriate PPE
Ensure work is clamped securely
Always use a RCD when using a portable drill
Remove any flammable materials
Keep hands clear of rotating drill
Avoid touching the drill or component immediately after drilling as they will be hot

11. State a safety precaution that must be observed when using drilling equipment to protect the safety of others.

Ensure work is securely clamped
Clean equipment after use
Advise colleagues to stand clear when drilling

12. State a safety precaution that must be observed when using drilling equipment to protect tools and equipment.

Inspect tools prior to use – leads, plugs, drill body, drill bit
Use a RCD
Use tools correctly
Select the correct drill bit for the task
Always use the guards provided
Check that the machine is securely mounted
Check the condition of the guards
Adjust the machine correctly prior to use
Only drill suitable materials
Use correct drilling speeds
Use appropriate cutting fluid
Clean the machine after use

ELEMENT FOUR
Demonstrate knowledge of using hand threading tools used to repair a component.

1. Complete the table by providing a function for each of the following hand threading tools.

	Explanation
Taps	A tap is designed to cut internal threads into a hole in metal objects, allowing bolts or studs to be fitted.
Dies	A die is designed to cut external threads.
Thread files	A thread file is used to repair an external thread.
Sleeve thread inserts	A thread insert is used when there is not enough material around the hole or when a specific thread is required.

2. Outline the procedure involved when cutting a thread in a blind hole using taps.

Step 1 Consult with the manufacturer's tapping and drilling chart and select the appropriate drill bit and tap.

Step 2 Drill the tapping hole.

Step 3 Using the taper tap and carry out steps 3 - 6 as above. Do not force the taper tap at the bottom of the hole as the tap may break off.

Step 4 Remove the taper tap and clean out the hole.

Step 5 Install the intermediate tap and repeat steps 3 – 4.

Step 6 Install the bottoming tap and repeat steps 3 – 4.

3. What is a thread gauge used for?

A thread gauge is used to identify the type and pitch of a thread

4. Outline the procedure involved when installing a thread insert.

1. Select a thread insert kit to suit the thread diameter and pitch required.
2. Select the correct drill bit from the kit.
3. Drill out the original thread.
4. Select the appropriate tap.
5. Tap the new thread.
6. Fit the Heli-coil onto the installation tool supplied in the kit ensuring that the tang on the Heli-coil is firmly inserted into the slot of the installation tool.
7. Screw in the Heli-coil into the tapped hole. This reduces the diameter of the Heli-coil allowing it to be threaded into place.
8. When the Heli-coil is in place, break off the tang.