GAUTENG DEPARTMENT OF EDUCATION

SENIOR CERTIFICATE EXAMINATION

METALWORK SG
(Second Paper: Theory)

POSSIBLE ANSWERS OCT / NOV 2006

QUESTION 1

1.1	B
1.2	B
1.3	C
1.4	D
1.5	B
1.6	C
1.7	D
1.8	B
1.9	D
1.10	B
1.11	C
1.12	B
1.13	D
1.14	C
1.15	B
1.16	C
1.17	D
1.18	D
1.19	B
1.20	D

[20]

QUESTION 2

2.1	2.1.1	T	
	2.1.2	T	
	2.1.3	F	
	2.1.4	T	
	2.1.5	F	
	2.1.6	T	
	2.1.7	F	
	2.1.8	T	
	2.1.9	F	
	2.1.10	T	(10)
2.2	2.2.1	Heat to bright red. Restores the malleability of a metal. Cover with sand, ash or lime.	
	2.2.2	Heated to bright red colour, quickly cooled in water or oil. Heat metal with a carbonising flame.	
	2.2.3	Subject metal to heat and place in carbon-rich material. Carbon penetrates surface. (2 each)	(6)

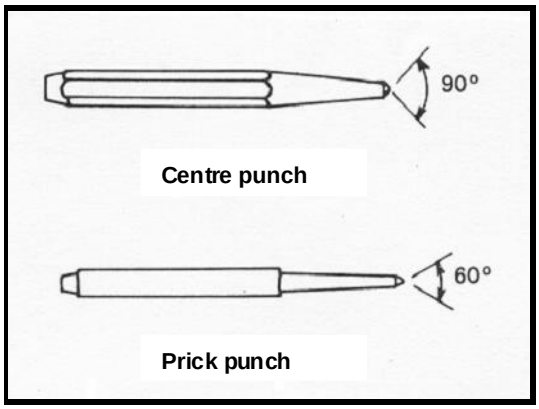
2.3 To absorb shock without breaking. (1)

2.4 Brown
Yellow
Orange
Red (Cherry)
Purple (Any 3) (3)
[20]

QUESTION 3

3.1 Centre punch 90º angle
Centre punch large
Centre punch: Boring of holes

Prick punch 60º angle
Prick punch is smaller
Prick punch: To make prick punch lines



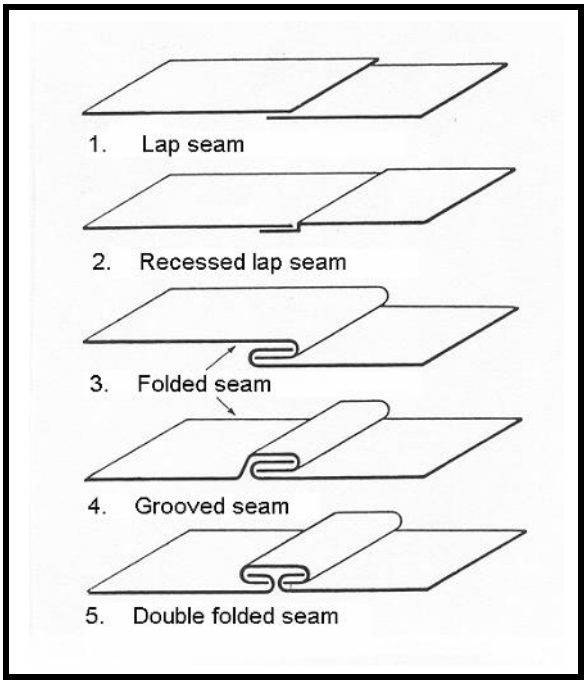
(3 each) (6)

3.2 3.2.1 Gripping and cutting
3.2.2 Eyes in wire
3.2.3 To work through small openings
3.2.4 Cutting of wire (4)

3.3 3.3.1 V-Block and clamp
3.3.2 Vice protection plates
3.3.3 Flat cold chisel
3.3.4 Tap wrench
3.3.5 Round-nose chisel
3.3.6 Dividers
3.3.7 Triangular file
3.3.8 Brass pin
3.3.9 Stillson wrench
3.3.10 Ball pene hammer (10)
[20]

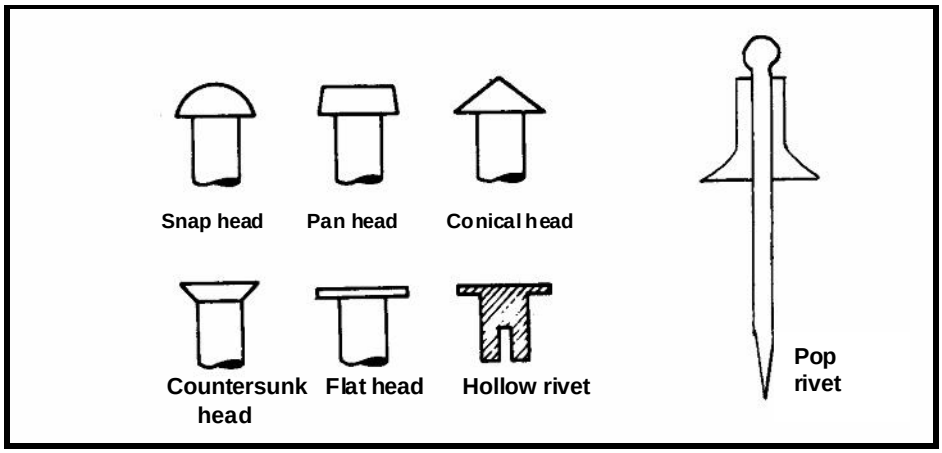
QUESTION 4

4.1



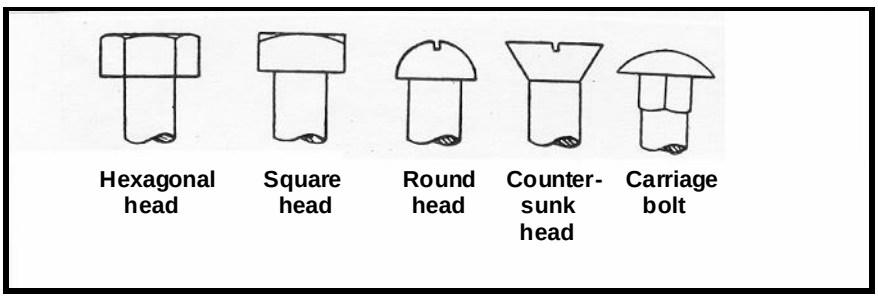
(5)

4.2



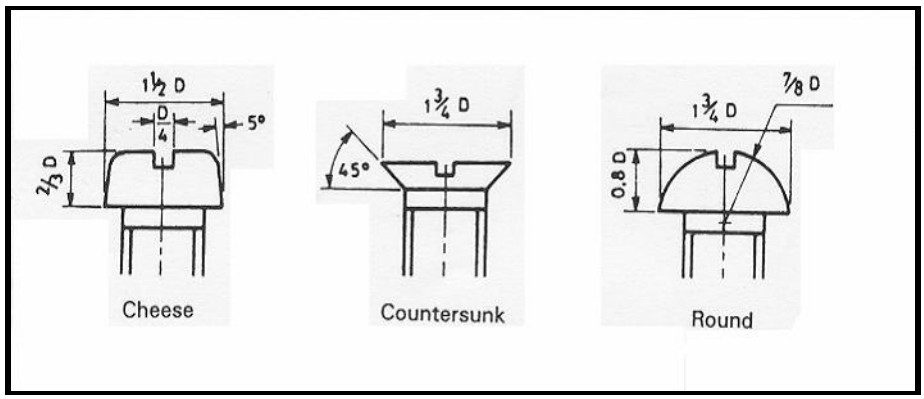
(7)

4.3



(5)

4.4



(3)
[20]

QUESTION 5

5.1

A.	Chuck	G.	Tailstock spindle lock lever	
B.	Driving plate	H.	Tailstock	
C.	Bent-tail carrier	I.	Tailstock hand wheel	
D.	Live centre	J.	Tailstock lock nut	
E.	Tailstock sleeve	K.	Tailstock base	
F.	Tailstock centre	L.	Lathe bed	(12)

5.2
- Test for cracks
- Paper washers on both sides of the grinding wheel
- Aluminium flanges for tightening must be ? of grinding wheel diameter
- To replace all shields
- To first turn the wheel by hand to check for balance
- Adjust the material support (6)

5.3
- Emery
- Carborundum
- Aluminium oxide
- Silicon carbide (Any 2) (2)

[20]

QUESTION 6

6.1 6.1.1
Red in colour
Soft
1083^0 melting point
Good conductor of heat and electricity does not rust. (4)

6.1.2
Can be alloyed
Can be soldered or brazed
Can be drilled or folded
Can be polished
Can be machined (Any 4) (4)

6.1.3

a)	Open pit mining	e)	Smelter
b)	Crushing	f)	Refining
c)	Milling	g)	Casting
d)	Flotation	h)	Shaping (8)

6.2 6.2.1 Ductility
6.2.2 Fusibility
6.2.3 Lustre
6.2.4 Hardness (4)
[20]

QUESTION 7

7.1 7.1.1 Scrap
Cold pig iron
Iron oxide
Iron ore
Alloy elements (5)

7.1.2
– Remove carbon electrodes
– Swing roof away
– Charge the furnace
– Close roof
– Lower carbon electrodes
– Strike arc
– Tap metal (Any 3) (3)

7.1.3
– A pre-determined voltage is maintained
– Electrodes gap is small enough to strike an arc
– Heat of the arc melts the furnace charge
– To prevent over heating of the furnace lining a low tension current is passed through for 15 minutes
– Melting process lasts 2 – 2½ hours
– Refining
– Alloy additions and tapping (7)

7.2 D x S = d x s
D = Driving Pulley
S = rpm driven pulley
d = Diameter driven pulley
s = rpm chuck of driven pulley (5)
[20]

QUESTION 8

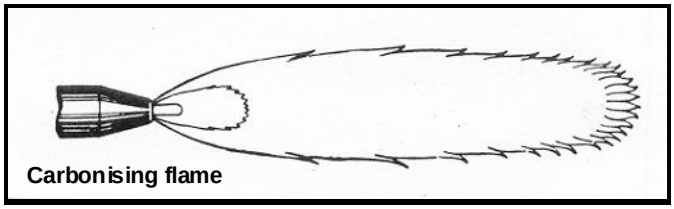
8.1 8.1.1 Thinner than 5 mm
8.1.2 Welding rod stay in welded pool to move steadily to the right. (2)

8.2 8.2.1 Permanent:
– Gas welding, arc welding
– Soldering

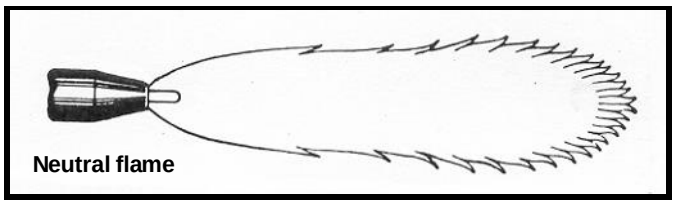
8.2.2 Semi-permanent:
– Rivets and seams

8.2.3 Temporary:
– Bolts and nuts
Metal screws 2x3=
(6)

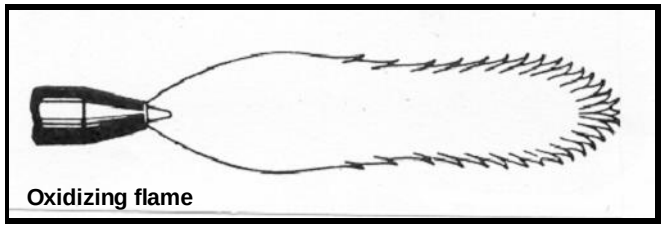
8.3 8.3.1 More acetylene
Less oxygen



8.3.2 50% oxygen
50% acetylene



8.3.3 More oxygen
Less acetylene



(9)

8.4 Copper
Silver
Cadmium
Gold
Phosphorus
Zinc

(Any 3) (3)

[20]

QUESTION 9

9.1 9.1.1
– Welding crater
– Under-cutting – overheating electrode
– Burn-through (Any 2)

9.1.2
– Slag inclusion
– Insufficient penetration
– Blow holes
– Hollow welds (Any 2)

9.1.3
– Reduced penetration
– Leg length is unequal
– Splatter

9.1.4
– Reduced penetration
– Leg length is unequal
– Rod sticks to metal (8)

9.2 – Metal core
– Flux coating (2)

9.3 A process of permanently joining metals using electricity
The heat of the arc melts the parent metal
Parent metal and electrode form a solid mass on cooling (3)

9.4	9.4.1	Arc length too short, low amperage, welding rod too thick	(Any 1)	
	9.4.2	Wrong joint preparation		
	9.4.3	Amperage too high, Welding rod too thin		
	9.4.4	Rod too thick, Amperage too low		
	9.4.5	Amperage too high, Rod too thin		
	9.4.6	Too slow welding speed		
	9.4.7	Welding speed too fast		(7)
				[20]

QUESTION 10

10.1	–	Identification of needs		
	–	Development of a design proposal		
	–	Organising and production		
	–	Evaluating		(4)
10.2	10.2.1	Ordinary solder		
	10.2.2	Fine solder		
	10.2.3	Plumber's solder		(3)
10.3	–	Relieve surface tension		
	–	To make the solder flow		
	–	To evenly spread the solder		
	–	Chemically clean the surface	(Any 3)	(3)
10.4	–	The iron must be cleaned and tinned		
	–	The iron must be hot enough		
	–	Parent metal must be hot enough		
	–	Joint must be chemically clean		
	–	Plates must be a perfect fit		
	–	Correct flux must be used	(Any 5)	(5)
10.5	–	Clean the hot bit		
	–	Point is cleaned in sal-ammoniac block		
	–	The solder is melted in the sal-ammoniac block		
	–	Tip is dipped in the molten solder		
	–	Solder sticks to tip of soldering iron ready to solder.		(5)
				[20]

TOTAL: 200