

POSSIBLE ANSWERS FOR:**MOTOR BODY REPAIRING SG****TIME: 3 hours****MARKS: 200****QUESTION 1****1.1**

- Cost of new body section (1)
 - Must shrinking be done? (2)
 - Are there any stretched sections? (2)
 - Must any section or surface be heated? (2)
 - Total cost of repairing? (1)
- [8]**

1.2

- Knocking out dents with a heavy panel hammer (1)
 - Knocking dents out with light panel hammer (1)
 - With a rubber hammer (1)
 - With a file hammer (1)
 - With a shrinking hammer (1)
- (any four) **[4]**

1.3

- No gas leaks (1)
 - Cylinder must be in an upright position (1)
 - Welding flame to be kept away from cylinders (1)
 - No oil or grease at valves. (1)
 - Use welding goggles. (1)
 - Use trolley to move cylinders around (1)
- (any five) **[5]**

1.4

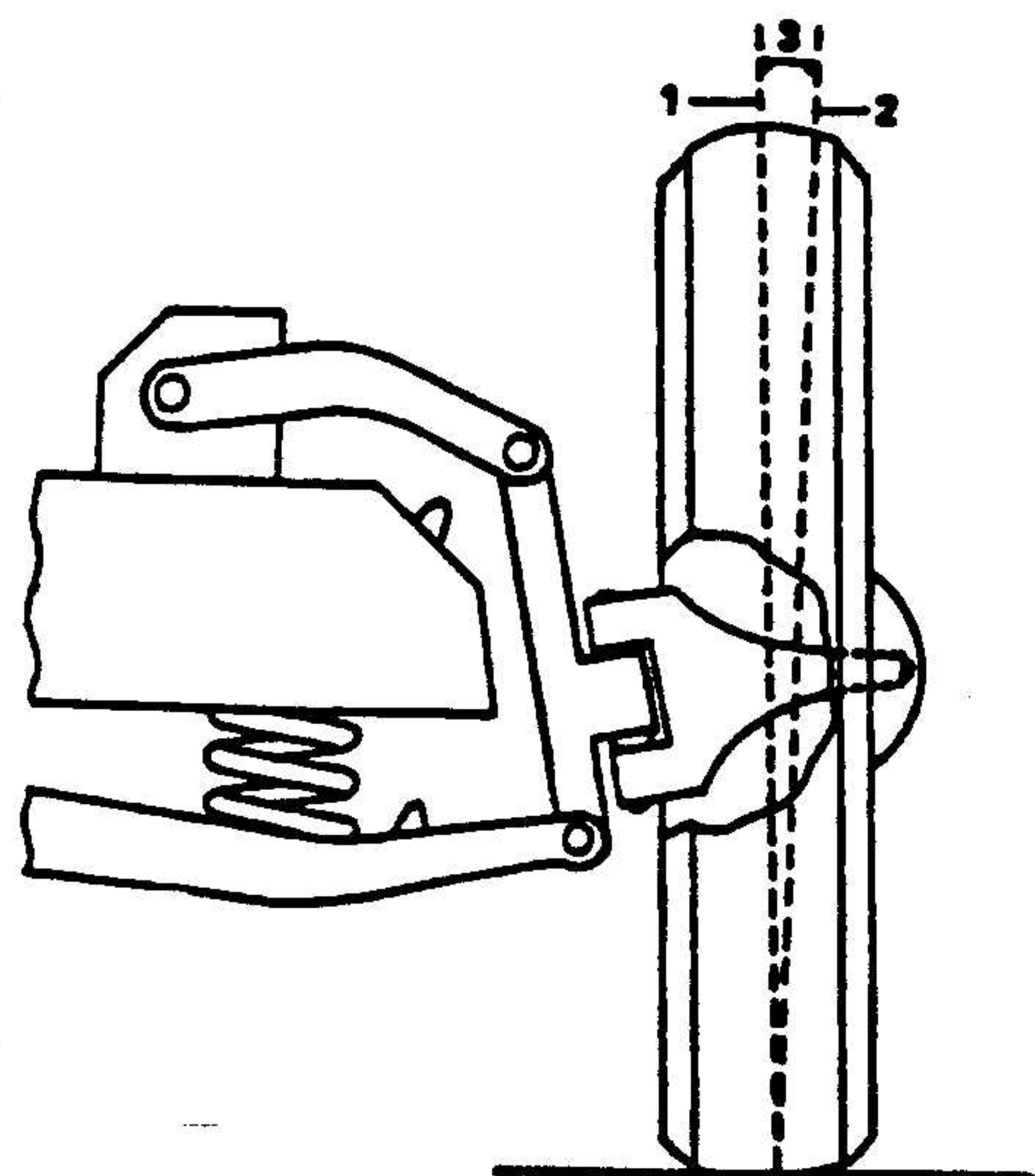
- Easy to handle (1)
 - Useful in different positions (1)
 - Effective when assembling body sections (1)
- (any two) **[2]**

- 1.5
- Cross method by using the "X" method with a rod compass (1)
 - Comparison method (1)
 - Cross method with rod compass (1)
- (any two) [2]
- 1.6 It serves as a hardener with fibre-glass work. [2]
- 1.7
- 1.7.1 Works better at bends and difficult areas (1)
 - 1.7.2 No heat is required (1)
 - 1.7.3 Strong and durable (1)
 - 1.7.4 Easier to finish (1)
- (any two) [2]
- 1.8
- 1.8.1
- Open valves at gas cylinders and set to the required pressure. (2)
 - Open acetylene valve until smoke disappears. (2)
 - Now open oxygen valve until the required flame is obtained. (2)
 - The cutting nozzle should not be placed too close to the surface. (2)
 - Always cut towards the operator. (2)
- [10]
- 1.9
- With conventional-type chassis, the body is bolted onto the chassis, i.e. body and chassis are two **separate parts**. (1)
 - With the integral-type chassis, body and chassis are manufactured in one piece. (1)
- [2]
- 1.10
- Grooves usually occur when sanding with the hand. (1)
 - By using the rubber block, a flatter surface can be obtained. (2)
- [3]
[40]

QUESTION 2

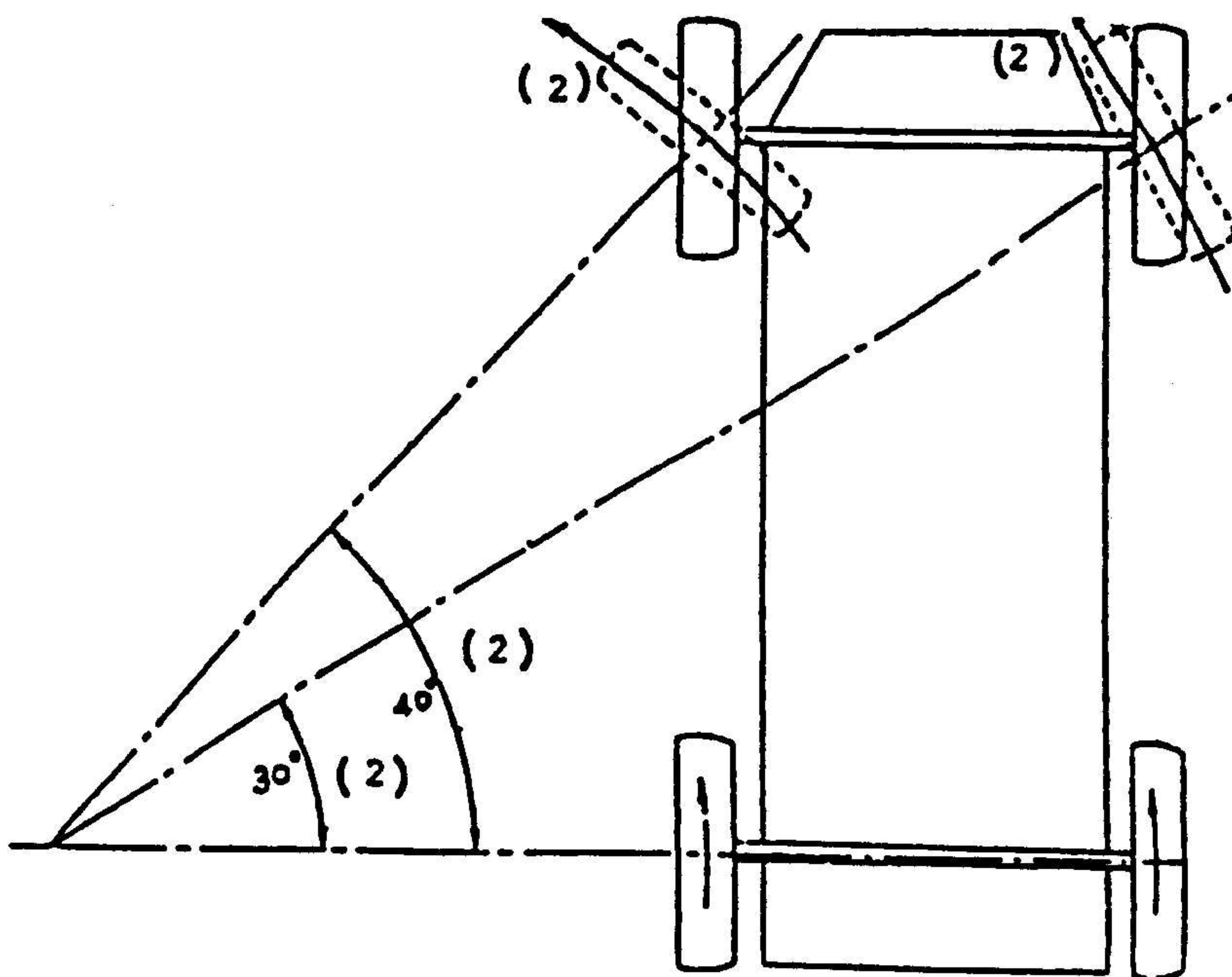
- 2.1.1 What is the condition of the tyres? (1)
 - 2.1.2 Are the tyres the same size? (1)
 - 2.1.3 Check for worn parts on the steering. (1)
 - 2.1.4 What is the condition of the shock absorbers? (1)
 - 2.1.5 Check front wheel bearings. (1)
 - 2.1.6 Tyre pressure must be the same. (1)
 - 2.1.7 King pins and bushes must be checked for wear. (1)
- [5]

2.2



Sketch (5)
Angles (5)
[10]

2.3



Sketch (4)
Angles (6)
[10]

2.4

2.4.1 Incorrect adjustments of toe-in.

2.4.2 Bad make of tyres.

2.4.3 Wrong settings of wheel alignment.

(1)
(1)
(1)
(any two) [2]

2.5

The setting of the front wheels is slightly inwards to compensate for the movement of the vehicle. The wheels tend to move outwards and therefore the wheels run straight.

(3)
[30]

QUESTION 3

- 3.1 Clean the surface thoroughly. Cut away loose pieces of fibre-glass from the edges of the hole.
 Roughen the surface, using a coarse file or rasp.
 If the hole is small, a support is not necessary.
 Paint a dissolving liquid onto the surface around the hole.
 Apply a resin.
 Wait until resin gets sticky, then lay fibre-glass mat on the inside and outside of the hole.
 Apply more resin to the hole and build up the hole.
 Leave to dry.
 Finish off by filing or grinding. [10]
- 3.2
- 3.2.1 Mixing board or container (1)
- 3.2.2 Old paintbrush (1)
- 3.2.3 A pair of scissors for cutting the fibre-glass mat (1)
- 3.2.4 Sanding machine with coarse and fine sanding paper (1)
- 3.2.5 Rubber block with fine sanding paper (1)
- 3.2.6 Clamps to keep in position (1)
- [5]
- 3.3
- 3.3.1 Rubber hammer
- 3.3.2 Grinding machine
- 3.3.3 Cross pin hammer
- 3.3.4 Body file
- 3.3.5 Shrinking hammer and dolly
- 3.3.6 Hydraulic jack
- 3.3.7 Porto-power
- 3.3.8 File hammer
- 3.3.9 Different shaped dollies
- 3.3.10 Flat and bent spoons [10]
- [25]

QUESTION 4

- 4.1 Remove door. (2)
- Test for bent door opening and pillar, using the "X" method or the cross method with rod compass. (2)
- Support the porto-power pack at a suitable place and push pillar back into position. (3)
- While pressing, keep measuring till size is right. (2)
- Measure at regular intervals until the door fits and the gap is even all around. 3
- Mount and fasten new door. (2)
- Sand down with 600 water sandpaper. (2)
- Apply primer. (2)
- Flatten surface. (1)
- Apply final layer of paint. (1)
- [18]

- 4.2 When steel exceeds its elasticity boundaries, form changing will occur. (5)
- 4.3 With elasticity of steel, it is understood that the steel can bend to a certain extent and return to its original position. (2)
[25]

QUESTION 5

- 5.1 Inspect body thoroughly and, if necessary, remove body. (2)
Press crack into position with the aid of a hydraulic jack. (3)
Ensure that the battery terminals are loosened / disconnected from battery before welding. (3)
Weld the crack with arc welding after sanding it down. (2)
Clean surface. (2)
Cut a piece of angle iron and weld it into position to ensure that the chassis does not crack again. (2)
Finish off by cleaning and painting. (2)
Replace and mount all sections. (2)
Measure using the "X" method to ensure that chassis is still aligned. (2)
[20]
- 5.2
- 5.2.1 The body can be removed. (1)
Easy to repair after an accident. (1)
Can carry heavy loads. (1)
(any two) [2]
- 5.2.2 Light body weight. (1)
Fewer rattles. (1)
[2]
- 5.3 Straightening of chassis and body **simultaneously** both with integral type according to damage. (Option 5.3.3) [2]
- 5.4
- 5.4.1 Strain is placed on the bodywork. (1)
5.4.2 Heavy steering. (1)
5.4.3 Faulty wheel alignment. (1)
5.4.4 Engine gearbox differential not aligned. (1)
5.4.5 Abnormal tyre wear. (1)
(any four) [4]
[30]

QUESTION 6

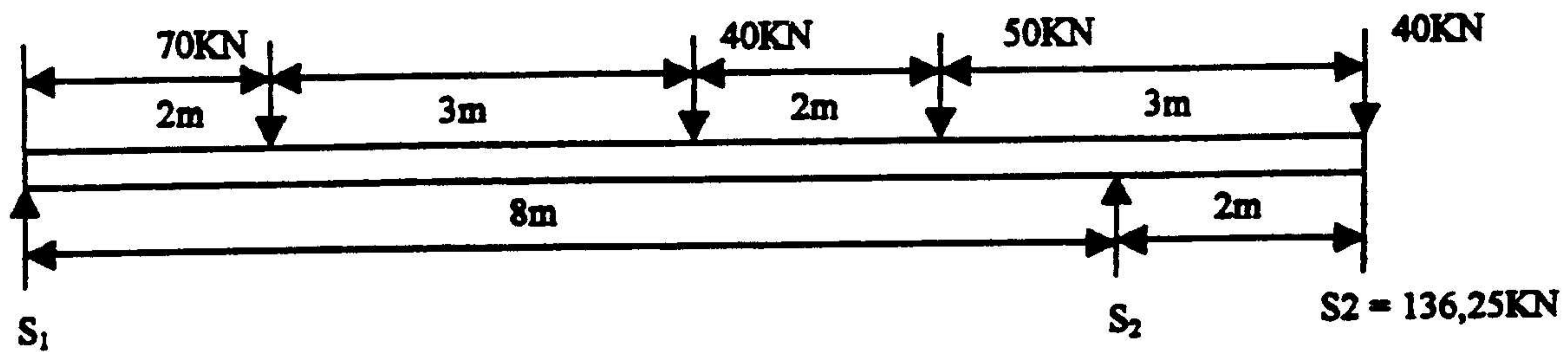
- 6.1
- 6.1.1 Wear a gas mask. (1)
- 6.1.2 No open flame to be permitted in the spray booth. (1)
- 6.1.3 Suction fan. (1)
- 6.1.4 Pressure gauge from compressor with air pressure. (1)
- 6.1.5 Fresh air only through filters. (1)
- 6.1.6 Electrical switches must be waterproof. (1)
- (any five) [5]
- 6.2 The paint layer is too thin.
Wrong air pressure
Spray gun too far from surface. (any two) [2]
- 6.3 Too much paint in one spot.
The paint is too thin.
Spray gun too close to surface.
Surface too cold. (any two) [2]
- 6.4 Air enters from the compressor through the inlet valve from where it is regulated.
Paint is sucked into the spray gun from the paint holder by means of the vacuum that is created and the quantity of paint is controlled at the fluid point.
The fluid needle starts and stops the flow of the paint.
The adjusting screw controls the flow of paint.
Compressed air is regulated by the air cap.
Spray pattern depends on the adjustment of the air valve.
The flow of paint and air is regulated by means of the trigger distributor.
The supply adjuster is controlling the amount of air passing through the holes in the air cap. [5]
- 6.5 When the primer has been sprayed on and small scratches or holes are still visible, spot putty must be put on (applied) and again sanded down, after which the final coat of paint can be applied. [5]
- 6.6 150 mm to 200 mm. [2]
- 6.7 Start by heating the centre portion approximately 17 mm in diameter until white hot.
After removing the flame, start knocking the outer edge of the dent out by hammering from the outside edge to the inside.
All stretched metal will be knocked to the middle.
Cool down the section slowly with water.
Counter weight is kept on the inside during beating.
When the dent has been removed, the body file can be used to finish off the surface if small dents remained.
When the surface is smooth, the necessary primer and final paint layer can be applied. [5]

- 6.8 The compressor must be provided with a pressure meter. The compressor must be provided with a water trap to prevent moisture from running to the spray gun along with the compressed air. [4]
[30]

QUESTION 7

- 7.1 Sand down surface with 220 water sandpaper.
Sand down feather edge of surface.
Clean and dry surface.
Spray on a thin layer of primer.
Apply another two layers of primer.
Leave to dry for 30 minutes
Body filler can be applied if necessary.
Smooth down with 220 water sandpaper.
Again spray one layer of primer.
Leave to dry properly.
Sand down with 600 water sandpaper.
Mix colour while waiting for the primer to dry.
Mix one part paint with three parts thinners.
Spray inside and outside of panel.
Spray thin layer paint. (10)
When paint is dry, spray another four coats.
Allow to dry for four hours
When dry, smooth down with 1200 water sandpaper.
Finish off with rubbing compound and polish.
- 7.2 The spray gun has its own lubrication and thinners will disturb this lubrication. (4)
- 7.3 Must be able to be pulverized. (1)
Colour must be stable and permanent. (1)
Must not tend to crack when dry. (1)
Must have a good bonding. (1)
Pigment must be easily mixable. (1)
(any three) [3]
- 7.4.1 Colour pigment. (1)
7.4.2 White pigment. (1)
7.4.3 Metal pigment. (1)
[3]
[20]
- TOTAL: 200**

WEIGHT OF BEAM



Take moments around S_1 (Find the answer for S_2)

$$\begin{aligned}
 \text{E.L.H.M.} &= \text{E.R.H.M.} \\
 (S_2 \times 8) &= (70 \times 2) + (40 \times 5) = (50 \times 7) + (40 \times 10) \\
 8S_2 &= 140 + 200 + 350 + 400 \\
 8S_2 &= 1090 \\
 S_2 &= \frac{1090}{8} \\
 S_2 &= 136,25\text{KN}
 \end{aligned}$$

Take moments around S_2

$$\begin{aligned}
 \text{E.R.H.M.} &= \text{E.L.H.M.} \\
 (40 \times 2) + (S_1 \times 8) &= (50 \times 1) + (40 \times 3) + (70 \times 6) \\
 &= 50 + 120 + 420 \\
 80 + 8S_1 &= 590 \\
 8s_1 &= 590 - 80 \\
 S_1 &= \frac{510}{8} \\
 &= 63,75\text{kn}
 \end{aligned}$$

Test: (for balance)

$$\begin{aligned}
 \text{E all the down forces} &= \text{E all the upward forces} \\
 70 + 40 + 50 + 40 &= 63,75 + 136,25 \\
 200 \text{ KN} &= 200 \text{ KN}
 \end{aligned}$$

\therefore Beam is in balance.

[40]

END

MOONTLIKE ANTWOORDE VIR:**MOTORBAKHERSTELWERK SG****TYD: 3 uur****TOTAAL: 200****VRAAG 1****1.1**

- Koste van nuwe bakdeel. (1)
 - Moet krimping gedoen word? (2)
 - Is daar enige gerekte dele? (2)
 - Moet enige deel verhit word? (2)
 - Totale koste vir herstelwerk. (1)
- [8]**

1.2

- Uitklop met swaar paneelhamer (1)
 - Uitklop met ligte paneelhamer (1)
 - Met 'n rubberhamer (1)
 - Met 'n vylhamer (1)
 - Met 'n krimphamer (1)
- (enige vier) **[4]**

1.3

- Geen gaslekkasies (1)
 - Silinder moet regop staan (1)
 - Sweisvlam mag nie naby silinders kom nie (1)
 - Geen olie of ghries op kleppe nie (1)
 - Gebruik sweisbril (1)
 - Beweeg silinders rond met trollie (1)
- (enige vyf) **[5]**

1.4

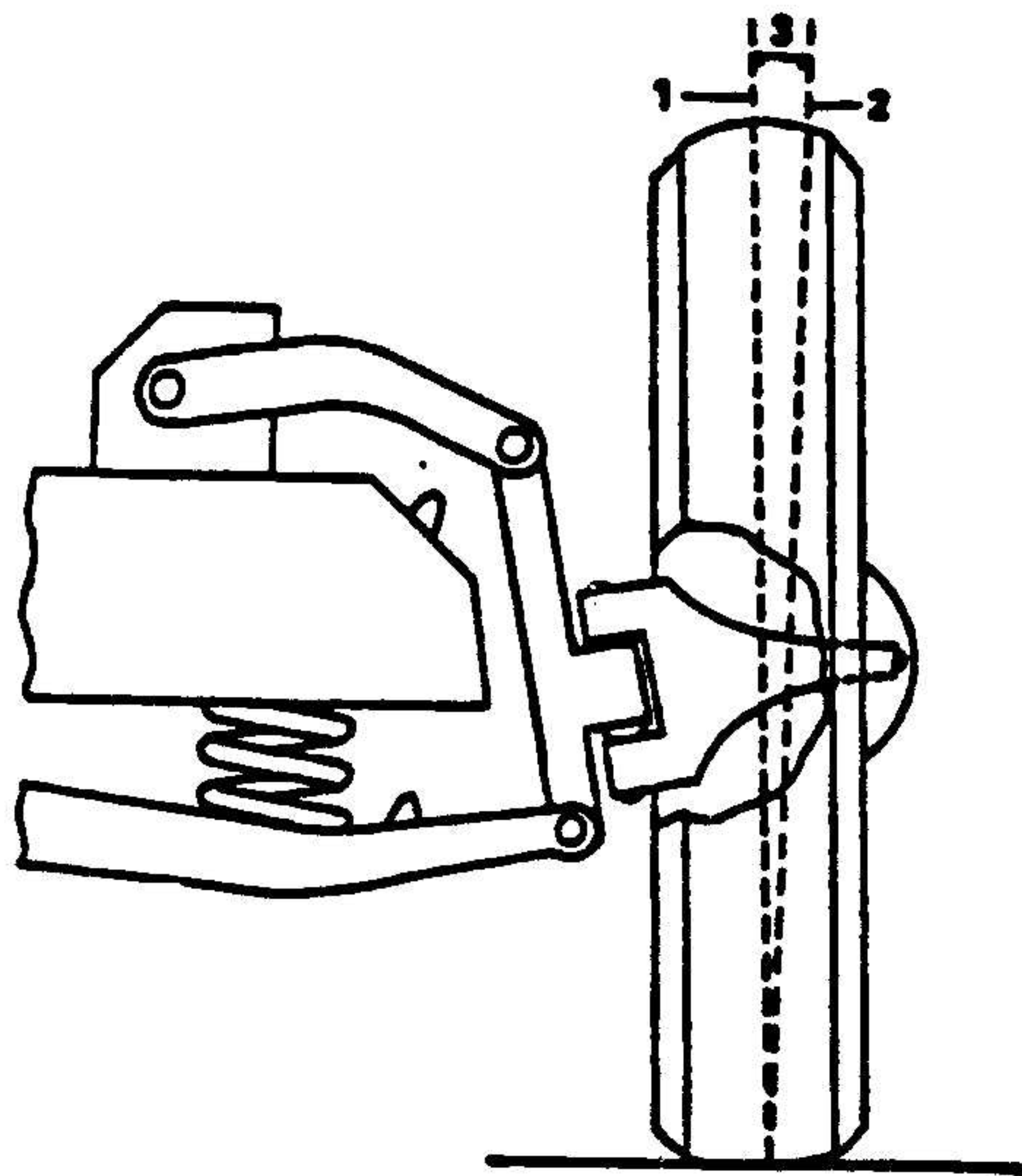
- Maklik hanteerbaar (1)
 - Kan in verskillende posisies gebruik word (1)
 - Effektief by montering van bakdele (1)
- (enige twee) **[2]**

- 1.5
- Oorkruismetode deur die "X"-metode te gebruik met 'n stangpasser (1)
 - Vergelykende metode (1)
 - Oorkruismetode met stangpasser (1)
- (enige twee) [2]
- 1.6 Dit dien as verharder by veselglaswerk. [2]
- 1.7
- 1.7.1 Werk makliker by voue en moeilike plekke (1)
 - 1.7.2 Geen hitte is nodig (1)
 - 1.7.3 Sterk en duursaam (1)
 - 1.7.4 Makliker afwerkbaar (1)
- (enige twee) [2]
- 1.8
- 1.8.1 Maak kleppe by gassilinders oop en stel druk soos verlang. (2)
 - Maak asetileenklep oop en draai tot rook verdwyn. (2)
 - Maak suurstofklep oop tot verlangde vlam verkry word. (2)
 - Die snypunt moet nie te na aan die oppervlak gedruk word nie. (2)
 - Sny altyd in die rigting van die operateur. (2)
- [10]
- 1.9 Konvensionele-tipe onderstel waar die bakwerk bo-op vasgebout word met ander woorde die bakwerk en onderstel is **verskillende dele**. (1)
- In die integrale-tipe onderstel word die bakwerk en onderstel as 'n eenheid vervaardig. (1)
- [2]
- 1.10 Slote kom gewoonlik voor wanneer met die hand geskuur word. (1)
- Met die rubberblokkie en skuurpapier kan 'n gelyke oppervlak verkry word. (2)
- [3]
[40]

VRAAG 2

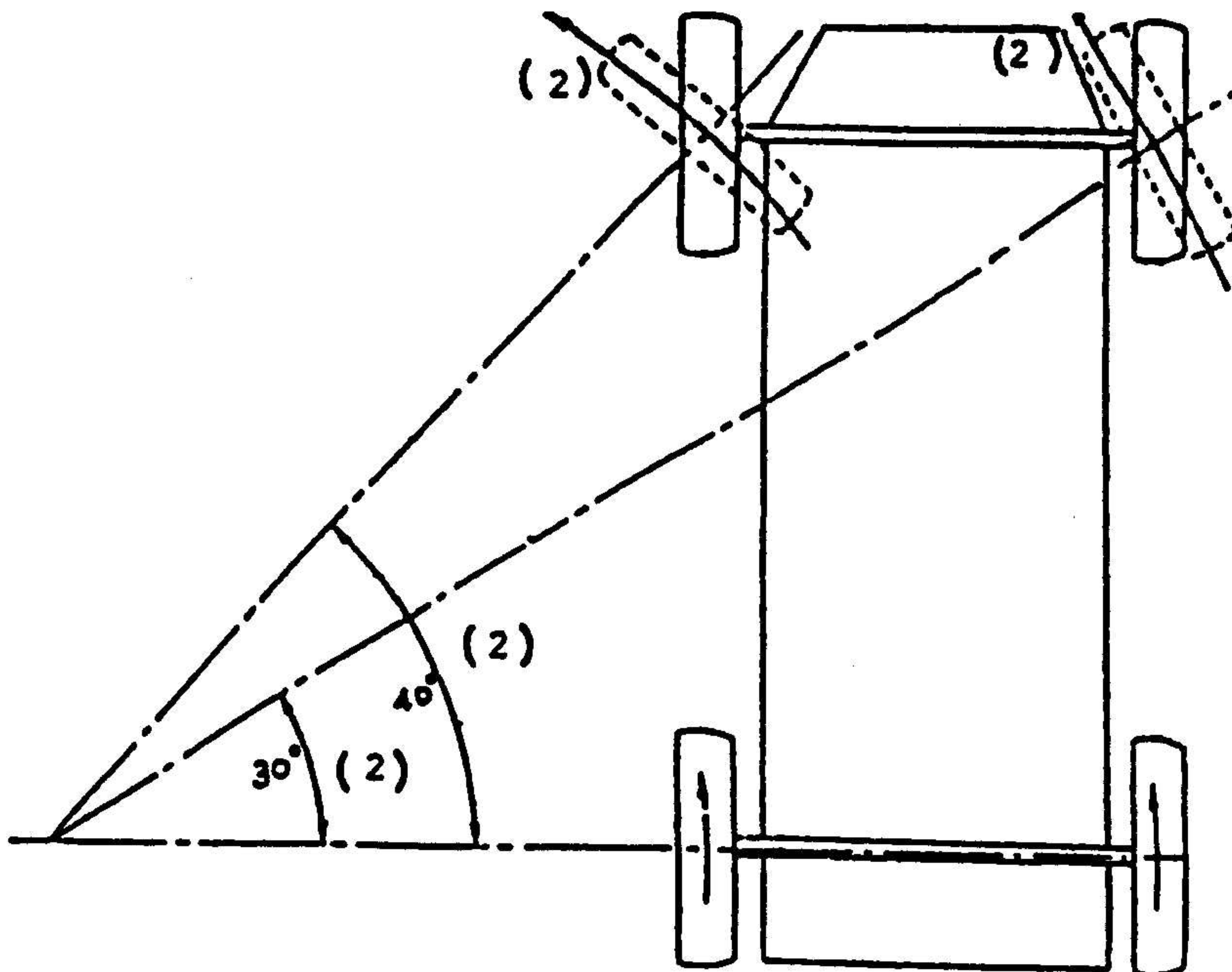
- 2.1.1 Wat is die toestand van die bande? (1)
 - 2.1.2 Is die bande dieselfde grootte? (1)
 - 2.1.3 Ondersoek vir verslete dele aan die stuur. (1)
 - 2.1.4 Wat is die toestand van die skokbrekers? (1)
 - 2.1.5 Ondersoek voorwiellaers. (1)
 - 2.1.6 Banddruk moet dieselfde wees. (1)
 - 2.1.7 Krinkspille en bussies moet vir slytasie ondersoek word. (1)
- [5]

2.2



Skets (5)
Hoeke (5)
[10]

2.3



Skets (4)
Hoeke (6)
[10]

2.4

2.4.1 As gevolg van foutiewe toe-spring.

(1)

2.4.2 Swak fabrikaat bande.

(1)

2.4.3 Foutiewe stel van wielspring.

(1)

(enige twee)

[2]

2.5

Die voorwiele word effens na mekaar toe gestel, om te kompenseer vir die beweging van die voertuig. Die wiele neig na buite en sodoende loop die wiele reguit.

(3)

[30]

VRAAG 3

- 3.1 Maak die oppervlak deeglik skoon. Sny los stukkies veselglas weg by die rante van die gat.
Maak die oppervlak growwer met 'n growwe veil of rasper.
As dit 'n klein gaatjie is, hoef dit nie ondersteun te word nie.
Verf 'n oplosvloeistof aan die oppervlak rondom die gat.
Wend gom aan.
Wag tot gom begin taai word en plaas dan veselglasmat aan die binne- en buitekant.
Smeer nog gom aan die gat en bou die gat op.
Laat droog word.
Werk af deur te vyl of te skuur. [10]
- 3.2
- 3.2.1 Mengbord of houer (1)
- 3.2.2 Ou verfkwas (1)
- 3.2.3 Skêr om veselglasmat mee te sny (1)
- 3.2.4 Skuurmasjien met growwe en fyn skuurpapier (1)
- 3.2.5 Rubberblokkie met fyn skuurpapier (1)
- 3.2.6 Klampe om in posisie te hou (1)
- [5]
- 3.3
- 3.3.1 Rubberhamer
- 3.3.2 Skuurmasjien
- 3.3.3 Dwarspenhamer
- 3.3.4 Bakvyl
- 3.3.5 Krimphamer en teehouer
- 3.3.6 Hidrouliese domkrag
- 3.3.7 Porto-krag
- 3.3.8 Vylhamer
- 3.3.9 Verskillende vorms teeouers
- 3.3.10 Plat- en gebuigde lepels [10]
- [25]

VRAAG 4

- 4.1 Haal deur af. (2)
- Toets vir gebuigde deuropening en pilaar deur die "X" metode of oorkruis-
meting met 'n stangpasser. (2)
- Stut porto-kragapparaat op 'n geskikte plek en druk die pilaar terug. (3)
- Meet kort-kort totdat die deur pas en die opening rondom dieselfde is. (3)
- Montering en vasmaak van nuwe deur. (2)
- Skuur af met 600 waterskuurpapier. (2)
- Spuut onderlaag aan. (2)
- Skuur dit glad. (1)
- Wend finale laag verf aan. (1)
- [18]

- 4.2 Wanneer staal sy elastisiteitsgrens oorskry, vind vormverandering plaas. (5)
- 4.3 Met **elastisiteit van staal**, word bedoel dat die staal tot 'n sekere mate kan buig en weer na sy oorspronklike posisie terugkeer. (2)
[25]

VRAAG 5

- 5.1 Ondersoek bakwerk deeglik en, indien nodig, verwyder bakwerk. (2)
Druk kraak in posisie met behulp van 'n hidrouliese domkrag. (3)
Maak seker dat die batterypole losgemaak/ontkoppel is van die battery voordat jy begin sweis. (3)
Sweis die kraak met boogsweiswerk nadat dit skoongeskuur is. (2)
Maak oppervlak skoon. (2)
Sny 'n stuk hoekyster en sweis dit in posisie vas sodat die onderstel nie weer kraak nie. (2)
Werk af deur dit skoon te maak en te verf. (2)
Plaas alle dele terug en monteer. (2)
Meet met die "X"-metode om seker te maak of die onderstel nog in lyn is. [20]
- 5.2
- 5.2.1 Die bakwerk kan verwyder word. (1)
Maklik herstelbaar na 'n ongeluk. (1)
Kan swaar vragte dra. (1)
(enige twee) [2]
- 5.2.2. Ligte bak (1)
Minder geraas (1)
[2]
- 5.3 Regbuig van die onderstel en bakwerk **terselfdertyd** met integrale konstruksie soos wat die skade bepaal. (Keuse 5.3.3) [2]
- 5.4
- 5.4.1 Stremming geplaas op die bakdele (1)
5.4.2 Swaar stuurwerk (1)
5.4.3 Foutiewe wielsporing (1)
5.4.4 Enjinratkasewenaar sal nie in lyn wees nie (1)
5.4.5 Abnormale bandslytasie (1)
(enige vier) [4]
[30]

VRAAG 6

- 6.1
- 6.1.1 Gasmasker moet gedra word. (1)
- 6.1.2 Geen oop vlam word in lokaal toegelaat nie. (1)
- 6.1.3 Suigwaaier (1)
- 6.1.4 Drukmeter vanaf kompressor met lugdruk. (1)
- 6.1.5 Vars lug alleen deur filtreerders. (1)
- 6.1.6 Elektriese skakelaars moet waterdig wees. (1)
- (enige vyf) [5]
- 6.2 Die verflaag is te dun.
Verkeerde lugdruk
Spuित्रoer te ver van oppervlak (enige twee) [2]
- 6.3 Te veel verf op een plek.
Die verf is te dun.
Spuित्रoer is te na aan oppervlak gehou.
Oppervlak te koud (enige twee) [2]
- 6.4 Lug word ingelaat vanaf die kompressor deur die inlaatklep en word daar beheer.
Verf word in die spuित्रoer ingesuiг vanaf die verfhouer deur middel van die vakuum wat veroorsaak word en die hoeveelheid verf word beheer by die vloeistofpunt.
Die vloeistofnaald begin en stop die vloei van die verf.
Die verstelskroef beheer die vloei.
Saamgepersde lug word by die lugdop beheer.
Sproeipatroon word deur die verstelling van die lugklep bepaal.
Die vloei van verf en lug word beheer deur die snellerverspreider.
Die versteller beheer die hoeveelheid lug wat deur die gaatjies in die lugdop gaan. [5]
- 6.5 Wanneer die onderlaag aangespuit is en klein krapmerkies of gaatjies nog waargeneem word, word stopverf aangesit en dan weer gelyk geskuur, waarna die finale laag verf aangespuit word. [5]
- 6.6 150 mm tot 200 mm [2]
- 6.7 Begin deur die metaal in die middel van die duik ongeveer 17 mm in diameter te verwarm. Verhit tot witwarm.
Wanneer die vlam weggeneem word, begin deur die buitenste rand van die duik uit te klop en werk na binne toe.
Al die gerekte metaal sal na die binnekant geslaan word.
Maak die deel stadig koud met water.
Teëgewig word aan die binnekant gehou tydens uitklopping.
Wanneer die duik verwyder is, kan afwerking met die bakvyl begin word as daar nog klein duikies is.
Wanneer die oppervlak glad is, word die nodige onderlaag en die finale verflaag aangewend.

[5]

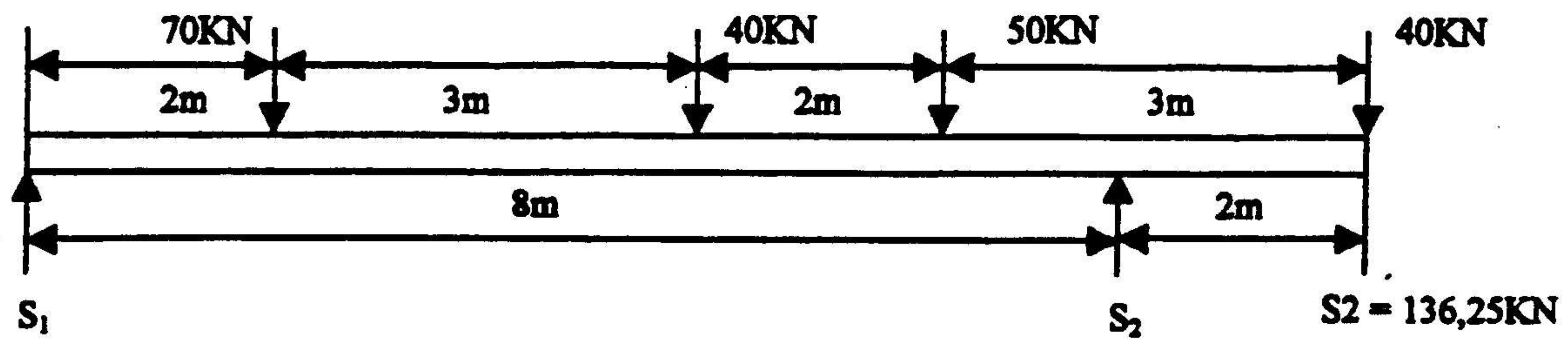
- 6.8 Die kompressor moet van 'n drukmeter voorsien word.
Die kompressor moet van 'n vogverwyderaar voorsien word, sodat vog nie saam met saamgepersde lug na die spuitroer vloei nie. [4]
[30]

VRAAG 7

- 7.1 Skuur die area met 220 waterskuurpapier af.
Skuur die veerrand van oppervlak.
Maak oppervlak skoon en droog.
Spuit 'n dun laag onderlaag.
Gaan voort en spuit nog twee lae onderlaag.
Laat droog word vir 30 minute.
Bakvuller kan nou aangewend word indien nodig.
Maak glad met 220 waterskuurpapier.
Spuit weer 'n laag onderlaag aan.
Laat behoorlik droog word.
Skuur oppervlak glad met 600 waterskuurpapier.
Meng kleur terwyl daar gewag word vir die onderlaag om droog te word.
Meng een deel verf met drie dele verdunner.
Spuit die binne- en buitekant van die paneel.
Spuit dun laag verf.
Wanneer dit droog is, spuit nog vier lae verf.
Laat staan vir vier ure om droog te word.
Wanneer dit droog is, skuur oppervlak glad met 1200 waterskuurpapier.
Rond af met skuurmiddel en politoer. (10)
- 7.2 Die spuitroer het sy eie smering en die verdunner sal hierdie smering beïnvloed. (4)
- 7.3 Dit moet fyngemaal kan word. (1)
Die kleure moet stabiel en permanent wees. (1)
Dit moet nie geneig wees om te kraak as droog nie. (1)
Dit moet 'n goeie dekkingsvermoë hê. (1)
Pigment moet maklik mengbaar wees. (1)
(enige drie) [3]
- 7.4.1 Gekleurde pigment (1)
7.4.2 Wit pigment (1)
7.4.3 Metaalhoudende pigment (1)
[3]
[20]

TOTAAL: 200

GEWIG VAN BALK



Neem momente om S1 (Kry S2 se antwoord)

$$\begin{aligned}
 \text{E.L.O.M.} &= \text{E.R.O.M.} \\
 (\text{S2} \times 8) &= (70 \times 2) + (40 \times 5) = (50 \times 7) + (40 \times 10) \\
 8\text{S2} &= 140 + 200 + 350 + 400 \\
 8\text{S2} &= 1090 \\
 \text{S2} &= \frac{1090}{8} \\
 \text{S2} &= 136,25\text{KN}
 \end{aligned}$$

Neem momente om S2

$$\begin{aligned}
 \text{E.R.O.M.} &= \text{E.L.O.M.} \\
 (40 \times 2) + (\text{S1} \times 8) &= (50 \times 1) + (40 \times 3) + (70 \times 6) \\
 &= 50 + 120 + 420 \\
 80 + 8\text{S1} &= 590 \\
 8\text{S1} &= 590 - 80 \\
 \text{S1} &= \frac{510}{8} \\
 &= 63,75\text{kn}
 \end{aligned}$$

Toets: (vir ewewig)

$$\begin{aligned}
 \text{E al die Afwaartse kragte} &= \text{E opwaartse kragte} \\
 70 + 40 + 50 + 40 &= 63,75 + 136,25 \\
 200 \text{ KN} &= 200 \text{ KN}
 \end{aligned}$$

\therefore Balk is in ewewig.

[40]

EINDE