

**RIIMPO319D Conduct
Backhoe/Loader Operations**

Name: _____ **Location:** _____ **Date:** _____

OPERATOR ASSESSMENTS

This assessment is designed for use on all makes and models of Skid Steer Loader/Backhoe. It contains both knowledge and practical components which when combined will be used to determine competence of the operator for the operation of the plant. This assessment contains elements that are based on the units of competency RIIMPO319D Conduct Backhoe/Loader operations, in partial completion of RII30813 Certificate III in Civil Construction Plant Operations.

This assessment must be used in conjunction with the Plant Risk Assessment, Manufacturers Operation & Maintenance Manual and any Organisational Procedures.

OPERATOR ASSESSMENT BRIEF

This assessment will be used for all operators and will consist of an oral/written knowledge assessment and a practical assessment that may be conducted in various operating tasks the plant will be involved in on the work site. It focuses on providing Assessments that enables competence to be demonstrated in the workplace. This competency meets the needs of industry, Quality Assurance and WHS requirements. If an Operator requires assistance in completing this assessment let the Assessor know as soon as is practicable.

ASSESSOR NOTES

This assessment will be used for all operators and sub-contractors and must be conducted in various operating tasks the plant will be involved in on the project. Operators are to be assessed in the course of their normal duties. A number of sessions may be required for the Operator to address all elements of the unit of competence incorporated into the assessment.

Underpinning knowledge should be determined after mapping Operator oral/written responses against model answers provided which assist to clearly define expected standards on the project and determine a final competency outcome. All assessor comments should be recorded at the time of assessment in the comment section of the assessment.

The assessor should indicate competency for each unit by marking clearly as Competent or Not Yet Competent on the assessment summary. Any training needs identified during the assessment should be noted on the Training request form and submitted to the Training unit for action.

If the Assessor utilises the services of a Subject Matter Expert, then they should countersign in the section allocated in the Assessment Summary. Any comments, feedback or criticism from the candidate is to be documented.

ACKNOWLEDGEMENT

I acknowledge that this competency based assessment focuses on providing an evaluation that enables capability to be demonstrated on a specific plant item.

Name of Operator: _____ **Signature:** _____ **Date:** __/__/__

KNOWLEDGE ASSESSMENT

1. Plan and prepare for Backhoe/Loader operations

1.1 Access, interpret and apply Backhoe/Loader operations documentation and ensure the work activity is compliant

1. What is the relevant WHS legislation?

- (a) WHS Act 2011
- (b) WHS Regulation 2011
- (c) All answers are correct

2. Health and safety responsibilities are defined in

- (a) The WHS Act 2011
- (b) The WHS Regulation 2011
- (c) Approved Codes of Practice
- (d) All answers are correct

3. Who is responsible for ensuring safe work practices are established and followed on a construction site?

- (a) The principal contractor or site Controller
- (b) The WorkCover inspector
- (c) The site safety officer and/or union delegate
- (d) The site HS committee

4. What instructions are you required to read, interpret and sign before work?

5. What is a safe work method statement (SWMS)?

6. What is the meaning of the following safety sign?



(white on blue background)

- (a) Pedestrian access allowed
- (b) Hearing Protection must be worn
- (c) Footwear cleaning station
- (d) Emergency exit

7. Which of the following signs indicates the location of the emergency exit?

- (a)  (black on yellow background)
- (b)  (white on green background)
- (c)  (white on blue background)
- (d)  (black text and red circle on white background)

1.2 Obtain, read, interpret, clarify and confirm work requirements

8. What would you be required to obtain from the relevant authority to operate a Backhoe/Loader in a hazardous working area?

1.3 Identify and address risks, hazards and environmental issues and implement control measures

9. What underground services would you check for before starting to excavate?

10. Who should be contacted in order to find out the location of underground services?

11. Name six hazards that must be checked on the work site before operating the Backhoe/Loader?

12. What is the minimum distance any part of the Backhoe/Loader is allowed to operate from:

- a) Distribution power lines
- b) High voltage transmission lines

NOTE: Assessors must ensure that the applicant is aware of State Authority regulations.

13. What precautions should you take when cutting a trench across a footpath?

**RIIMPO319D Conduct
Backhoe/Loader Operations**

13a. A Backhoe/Loader is conducting operations (see photo). Identify five (5) hazards involved in this job.



14. If using a Backhoe/Loader to lay pipes in a trench, what precautions should be taken?

15. What precautions would you take if a person were in a trench while you are lowering pipes into the trench?

16. Name five (5) site hazard checks that you would make of the work area?

17. What is the danger of starting and running an internal combustion engine in an enclosed space?

18. What action must be taken before starting up and whilst operating an internal combustion engine in an enclosed space?

19. What must be provided and maintained on the exhaust of an internal combustion engine when operated in a confined space?

20. Why is it important to keep the floor plates free from oil, grease and tools?

21. What must be provided to prevent a person falling into a trench?

1.4 Select and wear personal protective equipment appropriate for work activities

22. When should hearing protection (ear muffs) be worn?

23. When should an operator wear a safety helmet?

24. What is the minimum type of footwear that an operator should wear to operate loadshifting equipment?

1.5 Obtain, identify and implement traffic management signage requirements

25. How would you know where to place traffic control signs?

26. Where would you find the Traffic Control Plans (TCP's)?

1.6 Select, and check for faults, equipment and/or attachments for work activities

27. What checks does an operator make to ensure the blade is secure?

1.7 Obtain and interpret emergency procedures, and be prepared for fire/accident/emergency

28. What would you do if you came across a dangerous situation?

29. What are three things you would tell the ambulance?

30. How would you be notified of an emergency?

- a) Air horn
- b) Siren
- c) Alarm
- d) Radio transmission
- e) All answers are correct

31. If you are injured at work you should

- (a) notify your employer
- (b) seek first aid if required
- (c) seek medical attention if required
- (d) All answers are correct

2. Operate Backhoe/Loader

2.1 Carry out pre-start, start-up, park, shutdown and secure equipment procedures

32. What precautions must be taken when inspecting under a raised attachment?

33. Name three defects to look for when inspecting the hydraulic system.

34. When should slings be inspected?

35. What % wear in a shackle would cause it to be discarded?

36. What action should you take with tracks that are loose?

37. How would you know when the machine that you are operating should be serviced?

38. Why are you not permitted to join a chain sling with a bolt?

39. What percentage of broken wires within a rope lay or eight diameters of a wire rope sling would cause it to be discarded?

40. List six defects that would condemn a flexible steel wire rope (FSWR) from safe use?

41. List six defects that would condemn a lifting chain and hook from safe use?

42. What must you do if the SWL tag is missing from the chain sling?

43. How do you fill machine tyres with water ballast?

44. What defects would you look for when carrying out the external check on the bucket of an Backhoe/Loader?

45. What defects would you look for on the hydraulic rams and hydraulic pressure hoses?

46. When would you check the Backhoe/Loader transmission fluid?

47. What effect would a hydraulic leak in the quick hitch line have on the security of the bucket on a Backhoe/Loader?

48. What would you look for on an attachment to ensure it will not fall off?

49. What would you do if a strand were broken in a flexible steel wire sling?

50. What must be done to a lowered bucket before travelling on a road?

51. What must be provided on a Backhoe/Loader before it is used as a crane?

52. If a single wire in a sling was broken could you use the sling?
Explain your answer.

2.2 Coordinate activities with others at the site prior to commencement of, and during, the work activity

53. How would you know the access and path of movement is to work area for loads?

54. How would you know the Backhoe/Loader was suitable for ground conditions?

2.3 Continually monitor hazards and risks, and ensure safety of self, other personnel, plant and equipment

55. When a danger exists on a site what should be posted or erected to warn people of the danger?

56. What action would you take if you noticed a bulge form in one of the machines hydraulic hoses?

57. When should the operator carry out tests, checks and inspections on the Backhoe/Loader that is to be operated?

58. Describe how you would safely mount/dismount a Backhoe/Loader.

59. Where can the start-up/shut down procedures for each Backhoe/Loader be found?

60. Before performing the work with an Backhoe/Loader, what should you do if you have not used the machine before?

61. On mounting the Backhoe/Loader what should you do before attempting to start the engine?

62. Once sitting in the operator's seat and before driving off, what should you do for safety and comfort?

63. What should be referred to for the correct start up and shut down procedure for the equipment?

64. Before moving off what should be done with grounded attachments?

65. Before reversing an Backhoe/Loader, what action should you take?

66. Your Backhoe/Loader has run out of diesel, you refill the tank but the motor will not start. What could be the possible cause?

67. What action would you take with damage and defects found on the machine?

2.4 Drive and operate Backhoe/Loader, and modify the operating technique to meet changing work conditions

68. When would you be required to shore an excavation?

69. Under what conditions can a passenger ride on a machine with the operator?

70. How do you calculate the cubic capacity of the bucket of an Backhoe/Loader?

71. What are two conditions that would result in a trench shield or shoring been used?

72. You have to cut an excavation deeper than 1.5m. The workers have to enter this excavation and there is a likelihood that the walls may collapse. Using the Backhoe/Loader what could you do to make the excavation safe to enter?

73. You have to load a truck with large boulders using your Backhoe/Loader. You are on the same level as the truck. What are the dangers?

74. When travelling on a sloping surface which is the safest route of travel?

75. What gear should be selected to travel down a steep sloping surface?

76. What hazards would you check for on a travel route before moving the Backhoe/Loader to perform work?

77. To travel down or up a steep incline would you change gears on the incline or select the appropriate gear before travelling on the incline?

78. What documentation would you be required to obtain from an authorised person to operate an Backhoe/Loader in a hazardous working area?

79. What must you obtain before digging up a footpath with a Backhoe/Loader?

80. Name four types of attachments that may be used on a Backhoe/Loader?

81. On a construction site who would you contact to confirm the job requirements for the work to be performed with the Backhoe/Loader?

82. How do you select the appropriate bucket to perform the excavation work?

3. Lift, carry and place materials

3.1 Conduct communication practices associated with transportation and lifting of materials

83. Name three methods of communication?

3.2 Establish weight of load and ensure it is within safe operational limits of the machine

84. Why are you not allowed to hoist persons with the bucket of an Backhoe/Loader?

85. Why are you not allowed to attach slings to the teeth of the bucket?

86. You are required to operate a Backhoe/Loader on soft and uneven ground. What effect would this have on the load you could raise and carry with the Backhoe/Loader?

87. How would you establish the load that can be safely lifted by an Backhoe/Loader?

88. What must be provided on a Backhoe/Loader to attach slings so that the Backhoe/Loader may be used as a crane?

89. List two ways that you would assess the weight of a load to be hoisted?

90. What is the approximate weight of cubic metre of concrete?

91. Of topsoil or clay which is harder to excavate, push and spread?

3.3 Select, attach and use slings and lifting gear in accordance with safe working load requirements

92. What effect does a choker hitch around a square load have on the SWL for the sling?

93. A four legged bridle sling arrangement is attached to a rigid load. How many and which sling legs would be assumed to support the load?

94. What effect does a choker hitch around a round load have on the SWL for a wire rope sling?

95. State the rule of thumb formula to calculate the SWL of wire rope.

96. State the rule of thumb formula to calculate the diameter of the wire rope sling required to lift a specified load?

97. State the rule of thumb formula to calculate the SWL of a grade 80 lifting chain?

98. State the formula for calculating the WLL of grade 30 to grade 75 lifting chain?

99. What is the SWL of a 12mm diameter wire rope sling?

100. What is the diameter of a single leg wire rope sling that is required to hoist a 2048 kg load?

101. What is the SWL of a flexible steel wire rope (FSWR) 16mm in diameter?

102. When a sling is reeved around a square load how is the WLL/SWL altered?

103. What is the SWL of an 8mm diameter flexible steel wire rope (FSWR)?

104. What is the SWL of a 12mm mild steel chain?

105. What is the SWL of a 7.1mm diameter 80-grade chain?

3.4 Position machinery and ensure stability and locate to effectively shift materials according to job specifications

106. Is it permissible for loads to be slewed over the cabin of the truck when loaded? Explain your answer.

107. List three precautions that must be considered when dumping material into a truck using a Backhoe/Loader?

108. What action should be taken if you discover a large rock in the side of a trench that you are digging?

109. How far must people be kept away from the Backhoe/Loader when it is digging?

110. Name two methods that should be used to prevent a cave in of a trench or excavation?

111. What would be the indications that you are excavating quiet close to an underground service?

112. While excavating you suspect there could be an underground service in the area of the excavation, what action would you take?

113. How high must the bucket be kept above the ground when driving forward?

114. The load you are going to lift is likely to swing, how would you prevent this from happening?

115. Before reversing a machine what precaution should be taken?

116. When loading trucks using an Backhoe/Loader, where should the truck driver and other observers be?

117. What is the minimum diameter size tag line that can be used to control loads?

118. How are vehicles/machines stopped from coming too close to an excavation?

119. What are the dangers of driving your Backhoe/Loader close to the edge of an excavation?

120. How far away from an excavation must material be dumped?

121. How would you dismount a machine that contacted live power lines, which could not be released, or the power turned off?

122. If the slings shifted on a load been hoisted, what action would you take?

123. If you accidentally damaged an underground electrical cable, whom would you immediately contact to render the power supply safe?

124. The Backhoe/Loader you are operating overheats and needs to be checked for coolant level. What precautions would you take prior to removing the radiator cap and topping up the coolant?

125. If you are operating a Backhoe/Loader and it makes contact with power lines what should you do?

3.5 Shift load safely and effectively

3.6 Move load using hand/audible/communication signals

126. What is the hand signal for STOP?

127. What is the whistle for STOP?

4. Select, remove and fit attachments

4.1 Select attachment for the task

128. What bucket would you chose to excavate to lay pipes?

129. What bucket would you select to tidy up a work site?

4.2 Remove and fit attachment according to manufacturer's manual and site requirements

130. How would you know the requirements of a specific quick hitch for an Backhoe/Loader?

4.3 Test attachment and ensure correct fitting and operation

131. How would test the bucket is fitted correctly?

4.4 Use attachment in accordance with recommendations and design limits

132. Where would you find the capabilities of an attachment?

4.5 Remove, clean and store attachments in designated location

133. Where would you store Backhoe/Loader buckets in a suburban area over night?

5. Relocate the Backhoe/Loader

5.1 Prepare Backhoe/Loader for relocation

134. What must be lowered before travelling?

135. What shall be provided when a Backhoe/Loader has to be parked on float/low-loader?

5.2 Move Backhoe/Loader safely between worksites, observing relevant codes and traffic management requirements

136. What would you check for before moving a Backhoe/Loader between sites on a float?

5.3 Load and unload machine from float/trailer

137. Where would you find the tie down requirements for an Backhoe/Loader on a float?

6. Carry out machine operator maintenance

6.1 Prepare machine for maintenance

138. Name three areas where you would not park the Backhoe/Loader.

139. When leaving the Backhoe/Loader what should be done with all hydraulically raised attachments?

140. What type of surface is the ideal type to park an Backhoe/Loader on?

141. What is the danger of parking near an excavation?

142. Describe the correct way to park a Backhoe/Loader.

143. What shall be provided when a Backhoe/Loader has to be parked on or protrudes on to an access way?

144. For what reason should the key be removed from ignition of the machine?

145. Before leaving the site what must be provided to restrict access to the site?

146. List six things that must be done when parking the machine?

6.2 Conduct inspection and fault finding

147. What post-operational checks of an Backhoe/Loader should the operator carry out?

6.3 Carry out scheduled maintenance tasks

148. Where are Backhoe/Loader servicing requirements to be found?

6.4 Process written maintenance records

149. What are some of the maintenance records that must be kept as a requirement of Backhoe/Loader operations?

7. Conduct housekeeping activities

7.1 Clear work area and dispose of or recycle materials

150. Where would you dispose of unwanted materials?

7.2 Process records

151. What are some of the records that must be kept as a requirement of Backhoe/Loader operations?

KNOWLEDGE ASSESSMENT SUMMARY

Element	Result (Comp/NYC)
1. Plan and Prepare for work	
2. Conduct Pre-operational checks	
3. Operate Backhoe/Loader	
4. Lift, carry and place materials	
5. Select, remove and fit attachments	
6. Relocate the Backhoe/Loader	
7. Carry out machine operator maintenance	
8. Clean up	

Operator Declaration: I declare that the information contained above in the assessment summary is accurate and is a true reflection of the underpinning knowledge and practical assessment I undertook. I am aware that it is an offence under any WHS legislation to provide false, misleading or incomplete information.

Name of Operator: _____ **Signature:** _____ **Date:** ___/___/___

Assessor Declaration: I the person conducting the assessment declare that the above mentioned applicant undertook the appropriate underpinning knowledge and practical assessment in accordance with this assessment instrument. The information recorded above is a true reflection of this applicant’s assessment. I am aware that it is an offence under any WHS legislation to provide false, misleading or incomplete information on this assessment summary.

Name of Assessor: _____ **Signature:** _____ **Date:** ___/___/___

Comments/Feedback (Assessor to make additional comments in support of assessment results)

Subject Matter Expert:

Name: _____ **Signature:** _____ **Date:** ___/___/___

BACKHOE/LOADER ASSESSMENT

ANSWERS

1. C. All answers are correct.
2. D. All answers are correct
3. A. The principal contractor or site controller
4. SWIMS [safe work method statement] and pre-start
5. Details the hazards and control measures to be applied to a high risk task
6. B. hearing protection must be worn
7. B.
8. The required safe or hazardous work permits
9. Check for power, telephone, gas, water, sewer, drainage, fibre-optic cable lines
10. The site supervisor who will contact the supply authorities or council for maps of the site.
11.
 - Uneven/unstable ground,
 - Personnel
 - Powerlines,
 - Trees,
 - Overhead service lines,
 - Bridges,
 - Surrounding buildings, structures
 - Obstructions,
 - Other equipment,
 - Dangerous materials,
 - Underground services (gas, electricity, sewerage, water, communication lines)
 - Recently filled trenches.

12. (a) At least 2 metres from distribution powerlines
(b) At least 6 metres from high voltage transmission lines

NOTE: Assessors must ensure that the applicant is aware of Statutory Authority regulations.

13. Check council plans and maps and dig slowly

13a.

- * loose material
- * other plant
- * vehicles
- * open trench
- * other personnel
- * power lines

14. Attach slings to an approved lifting lug, make sure weight of pipe is within machine's SWL and don't place backhoe where trench could collapse

15. Ensure that the trench is shored and the person is standing well clear of either end of the pipes been lowered

16.

- Uneven/unstable ground,
- Personnel
- Powerlines,
- Trees,
- Overhead service lines,
- Bridges,
- Surrounding buildings, structures
- Obstructions,
- Other equipment,
- Dangerous materials,
- Underground services (gas, electricity, sewerage, water, communication lines)
- Recently filled trenches

17. Exhaust fumes given off by an internal combustion engine in an enclosed space can kill.

18. The 'enclosed space' must be adequately ventilated.

19. An approved exhaust control unit, catalytic converter (scrubber)
20. To prevent the foot plates from becoming slippery and causing operator to slip when mounting on dismounting
 To prevent the tools from fouling controls
21. Barricades, guardrails or fencing
22. When the noise level could contribute to the loss of hearing.
23. When there is a possibility that the person could be struck on the head.
24. Footwear that encloses the foot and has a non-slip sole
25. Outlined in the Traffic Control Plans
26. RTA TCAWS Manual version 4.0 June 2010 or state equivalent
27. Locking pins, keeper plates
28. Report it
29. Name of company, full address, symptoms or signs of the injured
30. E, all answers are correct
31. D, all answers are correct
32. Chocks, Blocks or safety bars must be used to prevent the bucket from falling.
33.
 - Oil leaks.
 - Loose connections.
 - Splits, fractures or bulges in hoses.
 - Bent piston rod.
 - Damaged rams
34. Prior to and after their use. (AS1666.1).
35. 10%
36. Adjust them

37. By the machine's service log or hour metre
38. Because the bolt is not an approved joining method and does not have a load rating.
39. 10% of the wires
- 40.
- One broken wire immediately below or above a terminal or end fitting.
 - Abrasion and core collapse.
 - Corrosion.
 - Kinks and fractures.
 - Crushed and jammed strands.
 - Birdcaging.
 - Damaged splices.
 - 10% of broken wires in 8 diameter of rope.
 - Stretched.
 - Affected by heat
- 41.
- Cracks in links.
 - Over 10% wear.
 - Over 10% elongation.
 - Over 5% wear or stretch in throat of hook.
 - Over 10% wear in bite hook.
 - Twisted or damaged links.
 - Rust marks.
 - Chain had been affected by heat.
 - Spot-welded links.
 - Stretched or locked links
 - Knotted
42. Check for the grade markings, if grade markings are not clear calculate for mild steel.
Then return to manufacturer for re-tagging
43. Wheel jacked up with the valve at the top of the wheel, fill with water to the
manufacturer's specifications, add antifreeze if required and then add air pressure.
44. Worn or missing teeth or a worn cutting edge and other damage to the actual bucket
and bucket pivot pins and keeper plates.
45. Leaks from seals, split or fractured hoses, and bent or damaged rams.

46. When the transmission is cold and after the transmissions hot or in-accordance with manufacturer's specifications
47. The quick hitch could release allowing the bucket/attachment to drop off
48. Ensure that all pins, clips and keeper plates are not worn, damaged or missing.
49. Discard it and it should never be used
50. Raise to a safe travel height
51. An approved lifting lug and SWL marking
52. Yes. You can use a wire rope provided that no more than 10% of the wires are broken in a length 8 times the diameter of the rope, unless the broken wire is immediately below or above a terminal or end fitting, then it cannot be used.
53. Vehicle movement plans
54. Check ground conditions prior to undertaking work
55. Warning signs, barricades, fences, guardrails
56. Inform supervisor, tag equipment and refrain from operating the loader until repairs were carried out.
57. Daily before use.
58. Facing the machine use the grab rail or hand rail and steps to mount/dismount the machine (Three points of contact).
59. In the appropriate manufacturer's manual.
60. Read the operator's manual to familiarise yourself with the machine (e.g. controls and decal information).
Seek training and supervision from your employer if you consider you cannot competently operate the equipment.
61. Make sure controls are in neutral or park and park brake is on.
62. Adjust seat until comfortable, adjust mirror (if applicable) and secure safety belt.
63. Always refer to the manufacturer's manual for the correct procedure.

64. Low to the ground and tilted back to provide maximum vision for travel.
65. Look over both shoulders to ensure the path of travel is clear and sound horn twice before moving unless there is a reversing alarm fitted. Continue to look in direction of travel.
66. Air in the fuel system and it needs to have the air bled from the system
67. Tag out the machine, put it out of service and report the damage or defects to the authorised person/supervisor
68. When people are to enter the trench and when the excavation is deeper than 1.5 metres and/or material is unstable or backfill
69. A special seat and seat belt must be provided within the safety confines of the machine for the passenger
70. Length x Width x Height divided by 2 [L x W x H divided x 2]
71. When the trench is deeper than 1.5m or material is unstable or backfill
72. Batter or bench the sides of the trench or place trench shields in the excavation
73. As you raise the bucket the boulders could tip out of the bucket onto the truck
74. Straight up or down the slope
75. Lowest possible gear
76.
 - Personnel
 - Hidden holes,
 - Drop offs,
 - Embankments,
 - Overhead obstructions,
 - Underground services,
 - Overhead power lines
 - Telephone lines
 - Other obstructions that could be dangerous.
77. Select low gear before proceeding down the slope
78. The required safe work permits

79. Approval from the relevant authority and maybe a permit to excavate
80. Auger, grapple, general purpose bucket, 4 in 1 bucket, mower attachment
81. The site supervisor
82. The size of excavation and type of material to be excavated
83. Radio, hand signals, verbal, radio
84. The manufacturer did not design the machine to hoist persons and it is against all safe operating procedures
85. You may break off the teeth, which may cause the load to fall which may injure or kill someone or damage the load. It is also against regulations to sling loads from the bucket of a loader without fitting the approved lift connection.
86. It would reduce the load that could be raised and safely carried.
87. By the load plate on the loader or by the manufacturer's recommendations
88. A manufacturer's approved lifting lug with the SWL marked on the machine.
- 89.
- By calculating the weight
 - delivery dockets
 - weighbridge certificate
 - weight marked on the item
90. 2.4 tonne
91. Clay
92. The SWL is reduced by half
93. Two legs of the sling which are diagonally opposite
94. It reduces the WLL/SWL by 25%. The sling will only be safe to lift 75% of its rated Capacity
95. Diameter in mm squared x 8 = SWL in kg
96. Square root of the load in kg divided by 8

97. Diameter in mm squared x 32 = SWL in kg or Diameter in mm squared x 80 x 0.4 = SWL in kg

98. Diameter in mm squared x grade x 0.3 = SWL in kg

99. $12 \times 12 \times 30 \times 0.3 = 1296\text{kg}$

100.

Square root of the load in kg divided by 8

= Square root of $4500/8 = 256$

= Square root of $256 = 15.858\text{mm}$

= 16mm diameter sling required. [rounded up to nearest full number from 15.858mm]

101. $16 \times 16 \times 8 = 2048\text{kg}$

102. Reduces the WLL/SWL by 50%.

103. $8 \times 8 \times 8 = 512\text{kg}$

104. $12 \times 12 \times 30 \times 0.3 = 1296\text{kg}$

105. $7.1 \times 7.1 \times 32 = 1613.12\text{kg}$

106. No. The driver could be in the cabin and the load could fall from the bucket or strike the cabin

107.

- The truck must be correctly positioned,
- No load must pass over the cabin of the truck,
- A layer of soil must be laid first to take the impact if large rocks are to be loaded

108. Remove it

109. Outside the working radius

110. Barricades, fencing, guardrails

111. Observe the spoil, the appearance of any of the following would be an indication of previous excavation work.

- Crushed blue metal
- Plastic tape
- Clean sand
- Sand bags
- Broken tiles
- Moisture
- Any other unusual material

112. Stop operating immediately and hand dig to investigate further. Check with appropriate authority to ascertain what maps/ plans are available for the area

113. Only high enough to provide ground clearance at all times.

114. Attach a tag line

115. Look over both shoulders to ensure the path of travel is clear. Sound the horn twice before moving unless there is a reversing alarm fitted. Whilst moving continue to look in the direction of travel

116. Within view of the operator and outside the working radius

117. 16mm

118. Barricades, fencing, signs, guardrails

119 The weight of the loader could cause the excavation to cave in particularly if the ground is effected by rain.

120. Not closer than 1 metre with material coming to rest no closer than 0.5 metres from the excavation

121. Jump well clear, making sure that you do not make contact with the ground and machine at the same time

122. Carefully lower the load and have the slings re-positioned and secured

123. The relative power supplier

124. Allow the machine to cool down, loosen radiator cap to release pressure using a cloth to protect from hot water burns then remove the radiator cap slowly. Top up using manufacturer's recommended coolant

125.

- Stay calm, remain in seat, warn other to keep away don't climb down off the machine.
- If you think the machine could catch fire or if you are alone jump well clear of the machine, don't make contact with the ground and the machine at the same time, if you have contacted underground power be aware the area around could be electrified.
- Remain near to the machine to warn others to keep clear, have someone notify the site manager/supervisor who should report immediately to the appropriate authority

126. Raised hand palm facing forward

127. One short blast

128. Excavation bucket [tooth bucket]

129. Mud bucket or cleaning up bucket

130. The manufacturer's manual

131. Crowding it in and out

132. In the manufacturer's manual

133. With the boom lowered down over the buckets to prevent theft

134. All hydraulically raised attachments

135. Dogs and chains

136. Route of travel, low trees, bridge clearance, obstructions, dogs and chains, park brake on

137. In the operator's manual and sometimes on the stickers fixed to the machine

138.

- Access ways,
- Near overhangs,
- Refuelling sites,
- Tidal or flood areas,
- Adjacent to an excavation.

139.

- Attachments lowered,
- Cutting edge flat on ground
- Lever placed in float position
- Pressure removed from hydraulic lines

140. A firm level surface

141. The excavation could collapse causing the front-end loader to over turn or to fall into the excavation

142.

- Attachments lowered,
- Cutting edge flat on ground
- Lever placed in float position
- Pressure removed from hydraulic lines

143. Barricades, fencing, signs, lights,

144. To prevent unauthorised movement

145. Barricades, fencing, signs, lights

146.

- Park clear of access ways overhangs and fuelling site.
- Park clear of excavations and trenches.
- Park clear of fire hazards.
- Park clear of entrances, exits.
- Parked clear of fire-fighting and electrical equipment.
- Park clear of tidal and flood areas.
- Park on a firm level ground or if on an incline facing slope.
- Lower the bucket with cutting edge on ground.
- Engine is stopped in accordance with manufacturer's manual (idle engine before turning off).
- Secure parking brake, leave controls in park position or in neutral.
- Remove the keys.
- Secured the machine against unauthorised movement.

147.

- Look under and around the loader for leaks or defects. Check the structure and equipment for defects and wear
- Check the oil, fuel and water level when the machine is cool.

148. Service log or manufacturer's manual

149. Fuel logs, service intervals, any previous maintenance, any current defects

150. Skip bins, tip site

151. Service books