

0171-508/008 Level 3 Technicals in Agriculture (Farm mechanisation) – March 2020

0171-32 Level 3 Technicals in Agriculture

1	State four reasons why shear bolts might frequently break on a machine. (4 marks)		
	Acceptable answer(s)	Guidance	Max mks
	<ul style="list-style-type: none"> • Wrong bolts being used (1) • Worn bush where shear bolt fits (1) • Lumpy feed to the machine (1) • When cultivating in hard/stony conditions (1) • Machine is being overloaded (1) or travelling too fast / too high a horsepower being used (1) 	1 mark for each, up to 4 marks Accept any other relevant answer	4
2	a) Explain why a differential is fitted to a tractor. (2 marks) b) Explain why a differential lock is fitted to a tractor. (2 marks)		
	Acceptable answer(s)	Guidance	Max mks
	a) <ul style="list-style-type: none"> • To allow one wheel to turn independently of the other on the same axle (1) when turning, the outside wheel turns faster than the inside wheel (1) b) <ul style="list-style-type: none"> • To obtain better traction (1) when one wheel on an axle is spinning and the other one is stationary (1) • To makes both wheels turn together (1) when one wheel starts to slip (1) 	a) 1 mark per point made, up to 2 marks: b) 1 mark per point made, up to 2 marks:	4

3	Describe two features of closed centre hydraulics. (4 marks)		
	Acceptable answer(s)	Guidance	Max mks
	<ul style="list-style-type: none"> • Uses a variable displacement pump (1), when services are not being used, no flow is delivered by the pump but system pressure is maintained (1) • They allow multiple hydraulic functions with one pump (1) with valves having equal priority (1) 	2 marks for each description, up to 4 marks Accept any other relevant answer	4
4	State four desirable characteristics of diesel engines, when compared to petrol engines, when used in tractors. (4 marks)		
	Acceptable answer(s)	Guidance	Max mks
	<ul style="list-style-type: none"> • Higher torque • Lower fuel consumption • Lower maintenance • More reliable • No electrical ignition system • Red diesel cheaper 	1 mark for each desirable characteristic stated, up to 4 marks Accept any other relevant answer	4
5	Explain two advantages of using an oscillating spout fertiliser spreader over a twin spinning disc fertiliser spreader. (4 marks)		
	Acceptable answer(s)	Guidance	Max mks
	<ul style="list-style-type: none"> • An oscillating spout fertiliser spreader is cheaper than a twin spinning disc spreader (1) and therefore is usually used on smaller farms (1) • An oscillating spout fertiliser spreader is lighter than a twin spinning disc fertiliser (1) and so can be safer to use on steep slopes (1) /cause less compaction (1) 	2 marks for each advantage explained, up to 4 marks Accept any other relevant answer	4

6	<p>a) Where can information regarding the size of an aquatic buffer zone, for a particular pesticide, be found? (1 mark)</p> <p>b) What is the reason for having pesticide aquatic buffer zones? (1 mark)</p> <p>c) How can aquatic buffer zones be reduced? (1 mark)</p>		
	Acceptable answer(s)	Guidance	Max mks
	<p>a) On the pesticide/product label</p> <p>b) To protect aquatic organisms from potential harm/avoids polluting waterways</p> <p>c) By using LERAP (Local Environmental Risk Assessment for Pesticides)</p>	<p>1 mark each</p> <p>Accept any other relevant answer</p>	3
7	<p>Explain three effects of inaccurate pesticide application. (6 marks)</p>		
	Acceptable answer(s)	Guidance	Max mks
	<ul style="list-style-type: none"> • Weeds, pests and diseases may not be controlled if pesticide is under applied (1) leading to lower yields and poor crop quality (1) • Over application could cause 'run off' (1) causing pollution, leading to possible fines (1) • Over applying would waste money (1) and could leave residual pesticide in the crop (1) • Over application could kill or damage the crop (1) and be illegal (1) 	<p>2 marks for each , up to 6 marks</p> <p>Accept any other relevant answer</p>	6
8	<p>State three reasons for cleaning out a crop sprayer thoroughly after use. (3 marks)</p>		
	Acceptable answer(s)	Guidance	Max mks
	<ul style="list-style-type: none"> • Some pesticides will separate and go hard if left in the sprayer (1) • Filter could block when next used (1) • Nozzle could block when next used (1) • It could harm the next crop (1) • Safer storage (1) 	<p>1 mark for each reason, up to 3 marks</p> <p>Accept any other relevant answer</p>	3

9	State two advantages of a centrifugal clutch fitted to an All-Terrain Vehicle (ATV). (2 marks)		
	Acceptable answer(s)	Guidance	Max mks
	<ul style="list-style-type: none"> • Easier to drive / No hand clutch (twist and go) • It is cheaper than other clutches. • Prevents the engine from stalling when the output shaft is slowed or stopped abruptly • Requires little maintenance • It is automatic 	1 mark for each advantage stated, up to 2 marks Accept any other relevant answer	2
10	State six ways to help prevent a Rough Terrain Telescopic Forklift (RTFL) from overturning, when loading a lorry with grain. (6 marks)		
	Acceptable answer(s)	Guidance	Max mks
	<ul style="list-style-type: none"> • Carry out a risk assessment • Ensure operator is trained • Check tyre pressures are correct • Load on level ground • Do not extend the boom any further than necessary • Do not travel with boom in the air • Keep speed down 	1 mark each, up to 6 marks Accept any other relevant answer	6
11	a) Which way should the operator lean, when cornering at low speeds with an ATV with no differential? (1 mark) b) Explain two reasons for your answer in 11a). (4 marks)		
	Acceptable answer(s)	Guidance	Max mks
	a) The operator should lean out, away from the corner b) <ul style="list-style-type: none"> • As the ATV has no differential it will be difficult to turn (1) as both back wheels are turning at the same speed (1) • Leaning to the outside of the corner will take weight off the inside wheel (1) allowing it to slip, aiding turning (1) 	a) 1 mark b) 2 marks per explanation, up to 4 marks	5

12	When using a Rough Terrain Telescopic Forklift (RTFL), the safe load indicator stops working. Describe three actions that should be taken. (3 marks)		
	Acceptable answer(s)	Guidance	Max mks
	<ul style="list-style-type: none"> • Report the problem to your immediate supervisor • Do not use the RTFL • Put a sign on the machine to warn others not to use it • Wait until it has been fixed by a qualified person 	1 mark for each action, up to 3 marks Accept any other relevant answer	3
13	You would like an All-Terrain Vehicle (ATV) for the farm you are working on. The farmer is considering it, but has asked you to justify its purchase. Discuss the benefits of having an ATV on the farm and the advantages and disadvantages it has over a tractor. (12 marks)		
	Acceptable answer(s)	Guidance	Max mks
	<p>Band 1 (1-4 marks) Limited benefits of an ATV discussed. There will be limited discussion of the advantages and disadvantages an ATV has over a tractor. Answer may be disorganised and ambiguous.</p> <p>Band 2 (5-8 marks) Adequate benefits of an ATV discussed. There will be adequate discussion of the advantages and disadvantages an ATV has over a tractor. There will be some use of specialist terms, although they may not always be used appropriately. The information is presented mostly in a structured format.</p> <p>Band 3 (9-12 marks) Detailed benefits of an ATV discussed. There will be detailed discussion of the advantages and disadvantages an ATV has over a tractor. Specialist terms will be used correctly and appropriately. Information will be presented in a structured and logical format.</p>	<p>Indicative content</p> <p>Benefits</p> <ul style="list-style-type: none"> • Having an ATV can free up a tractor to do other work • The ATV is very versatile with numerous attachments. • It can be used for many jobs, such as: • Feeding and checking stock and crops out in the field • Carrying small loads around the farm • Slug pelleting, spraying and fertiliser spreading, especially small steep fields • Taking soil samples, quickly and more accurately if GPS is used <p>Advantages</p>	12

- Cheaper than a tractor to purchase and maintain
- Small and therefore does not take up much space in the barn and can get in to tight spots
- Quicker and more manoeuvrable
- Uses less fuel and so is more cost effective
- Easier to drive, training is quicker and more people could potentially drive it.
- Quick to get on and off when opening gates, saving time and money
- Low ground pressure and so can be used when a tractor might get stuck with less damage to soil structure and more timely operations
- Can be used on steeper slopes, better for checking stock in more remote areas, or putting on inputs to improve grass growth.

Disadvantages

- It is limited in the tasks it can perform as it:
- Does not have 3-point linkage and so cannot use a lot of equipment
- Needs its own attachments purchased separately from that of a tractor
- Does not have a cab and so driver is open to the elements
- Cannot be fitted with a loader and hasn't the power to do many jobs
- Uses much smaller attachments to a tractor and so therefore can take more time

For no awardable content, award 0 marks.