

0171-515 Level 3 Land-based Engineering - Theory exam (1) - March 2018

0171-38 Level 3 Advanced Technical Extended Diploma in Land-Based Engineering (1080)

Q	Acceptable answer(s)	Guidance	Max mks
1	<p>Torque = force x distance or Torque = Newton x Meters (1 mark)</p> <p>400 mm converted to meters / 1000 = 0.4m (1 mark)</p> <p>Force= Torque/distance 62.5/0.4 = 156.25 Newton (1 mark transposition of formula and 1 mark correct answer)</p>		4
2	<p>PTO dynamometer:</p> <ul style="list-style-type: none"> a) 1 mark for: To connect a tractor PTO drive to measure power, Torque and fuel consumption b) 1 mark for any one of the following: HP, kW, lbft , Nm, g/KwHr <p>Vernier gauge:</p> <ul style="list-style-type: none"> a) 1 mark for: Measure internal and external dimensions b) 1 mark for: mm <p>Induction ammeter:</p> <ul style="list-style-type: none"> a) 1 mark for: Measure current flowing in a circuit. b) 1 mark for: amps 	Accept any other suitable examples	6
3	<p>a) $0.33+0.5+0.625+0.25 = 1.705$ (1 mark)</p> <p>b) 2/2.0 (1 mark)</p>		2
4			10

	<p>a)</p> <p>I. Area = base x height – 1 mark for formula a. Area = $40 \times 25 = 1000\text{m}^2$ - 1 mark for calculation and 1 mark for correct answer</p> <p>II. Area = $\frac{1}{2} \times \text{base} \times \text{height}$ – 1 mark for formula a. Area = $\frac{1}{2} \times 25 \times 25 = 312.5\text{m}^2$ 1 mark for calculation and 1 mark for correct answer</p> <p>III. Total area = $1000\text{ m}^2 + 312.5\text{m}^2 = 1312.5\text{ m}^2$ (1 mark)</p> <p>b) Number of passes = total area/ width of sprayer (1 mark) $1312.5\text{ m}^2 / 30\text{m} = 43.75$ (1 mark)</p> <p>c) 44 (1 mark)</p>		
5	The weight of the lightweight/hollow float (1) is displaced by an equal amount of liquid. (1)	Accept any other suitable answer	2
6	<p>a) 1 mark each up to 3 marks: A - Inter or after cooler. B - Intake pipe C - Turbocharger</p> <p>b) 1 mark per point, up to 3 marks</p> <p>To reduce air temperature (1) and density (1) enabling greater mass of air to enter the engine and increase power output (1). 3 marks</p>	Accept any other suitable answer	6
7	<p>a) 1 mark per point, up to 3 marks:</p> <p>A pump is needed to generate flow (1) and pressure (1) within the system. The system has internal restrictions (1) e.g oil ways and galleries</p> <p>b) 1 mark per point, up to 3 marks:</p> <p>A pump is not necessary (1). Oil is distributed by moving parts (1) and helps to reduce component temperature (1)</p>	Accept any other suitable answer	6
8		Accept other suitable answer	6

	<p>a) 1 mark each, up to 3 marks</p> <p>B= Piston skirt C= Gudgeon or piston pin D= Compression ring</p> <p>b) 1 mark per point, up to 3 marks:</p> <p>Forms a gas tight seal against the cylinder wall to prevent combustion gases escaping (1). It enables maximum pressure to force piston down the bore on the power stroke (1). It transfers heat to the cooling system. (1)</p>		
9	<p>A – Float valve shuts off the fuel (1) when maximum amount of fuel in float bowl. (1)</p> <p>B – Main nozzle or emulsion tube breaks up the fuel into small droplets (1) to mix with air in venture(1)</p> <p>C – Float rises and falls with fuel level (1) to maintain correct fuel level for main nozzle and jet. (1)</p>	2 marks per description per part, up to 6 marks	6
10	<p>Band 1 (1-4 marks) The candidate has failed to diagnose many of the faults. The candidate has provided minimal rationale for the solutions they have proposed. The candidate's responses will not have included any measurements taken. The discussion will have little or no structure.</p> <p>Band 2 (5-8 marks) The candidate has discussed some faults, but not in a logical sequence. The candidate has provided some reasoning for the solutions they have proposed. The candidate's has included at least one measurement to be taken.</p> <p>Band 3 (9 -12 marks) The candidate has discussed most of the faults in a logical sequence and has provided clear reasoning why they have proposed each solution. The candidate has where applicable suggested expected outcomes to their proposed solution. All expected measurements have been provided.</p>	<p>Indicative content</p> <ul style="list-style-type: none"> • Condition of fuel • Air systems • Service history poor maintenance • Fuel leaks • Cylinder compression test • Injector pop test • Water separators • Injector pump timing • Faulty injection pump • Simple tests first and then removal/testing of components to isolate possible causes. • Compression reading 24 to 35 bars. Pop test 170 to 250 bar. <p><i>For no awardable content, award 0 marks.</i></p>	12