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VOCATIONAL TALENT EXERCISES, PART D. ANSWERS.

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ANSWERS TO QUESTIONS IN "VOCATIONAL TALENT EXERCISES, PART D" (VT 004 462) ARE GIVEN. OTHER RELATED DOCUMENTS ARE VT 004 454 THROUGH VT 004 471. (EM)

V O C A T I O N A L

T A L E N T

E X E R C I S E S

P A R T D

A N S W E R S

The George Washington University
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ANSWERS

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VOCATIONAL TALENT EXERCISES

PART D

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Exercise 24 - Technical Comprehension

Part 1 - Simple Impulse Turbine

Question	Answer	Explanation
1.	A	The turbine wheel will turn clockwise because the steam is forced against the curved blades.
2.	A	The steam pressure is greatest at point A or just before it enters the nozzles where pressure drops and velocity increases.
3.	B	The velocity of the steam is greatest at the point where it leaves the nozzle and enters the turbine.
4.	C	Steam comes out of the four nozzles.

Part 2 - Centrifugal Pump

1.	C	As the impeller blades turn, liquid is thrown outward. To equalize the pressure, more liquid flows into the pump at the eye.
2.	B	The impeller wheel turns counterclockwise to force the liquid into the discharge pipe.
3.	A	Centrifugal force causes the liquid to flow away from the center, thus causing greater pressure in the discharge pipe.
4.	B	The blades of the impeller wheel are bent away from the direction of rotation so they will help force the liquid to the outside.

ANSWERS

Exercise 24 - Technical Comprehension

Part 3 - Parallel Circuit

Question	Answer	Explanation
1.	A	Closing switch 1 completes the circuit through bulb 1.
2.	B	Bulbs 1 and 2 will burn because the circuit is complete between these bulbs and the battery. Bulbs 3, 4, and 5 will not burn because these three bulbs are in series and bulb 4 is needed to complete the circuit.
3.	B	Bulbs 1, 2, and 3 will burn. The wire from point D to point G will complete the circuit through bulb 3 by putting it in parallel with bulbs 1 and 2.
4.	A	A wire between point D and the positive connection of the battery will put bulb 3 in a direct connection with the battery.
5.	C	A wire from point H to point F will make a direct connection, by-passing switches 2 and 3.
6.	D	Bulb 1 is a parallel connection and when it is unscrewed it will be the only bulb affected.

Part 4 - Treadle and Crankshaft Action

1.	A	The treadle moves back and forth, making an up-and-down motion in the connecting rod. This type of a repeating motion is called reciprocating.
2.	B	Point B moves in a circle as the band wheel turns.
3.	C	Point B will be at point E when the treadle is down.
4.	B	The flywheel action of the band wheel will move the upper end of the connecting rod to point D when the treadle returns to point A.

Exercise 25 - Abstract Reasoning--Part 7

Drill 1				Drill 2				Drill 3			
1.	B	4.	B	7.	C	10.	D	13.	B	16.	E
2.	A	5.	E	8.	B	11.	A	14.	D	17.	A
3.	C	6.	D	9.	A	12.	E	15.	C	18.	B

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Exercise 26 - Technical Comprehension

Part 1 - Ramjet Engine

Question	Answer	Explanation
1.	A	The diagram shows the fuel nozzle location.
2.	D	It is the difference in the speed of the air at the intake and the speed of the exhaust that gives the ramjet its thrust.
3.	C	Combustion begins at point C.
4.	D	Pressure at point D is highest. As the ignited mixture goes through the venturi, the velocity is somewhat increased.

Part 2 - Jet Pump

1.	A	This is the pipe that brings in the steam.
2.	B	The nozzle increases the speed of the steam to make the pump work.
3.	C	In this chamber the pressure is low because the jet going through point F drives fluid out of the chamber.
4.	D	The pressure is greatest at point F.

Part 3 - Telephone Transmitter

1.	B	When carbon granules are compressed the resistance decreases.
2.	A	The diaphragm is wired to the negative side of the battery.
3.	C	The moving front electrode is mounted on the diaphragm and moves in and out with it.
4.	A	The diaphragm and moving front electrode are connected.
5.	A	The diaphragm is flexible so that when sound waves strike it, it will move in and out at the center.
6.	C	The secondary of the coil is not directly connected to the primary circuit.

ANSWERS

Exercise 26 - Technical Comprehension

Part 4 - Jack

Question	Answer	Explanation
1.	C	The top of the jack moves the distance indicated by "p".
2.	D	The distance "p" is known as the pitch. This is the distance between the top or crest of each thread and the next one.
3.	A	The power factor is about 600 to 1. The power factor is the same as the number of feet the end of the jack handle moves to make the top of the jack move one foot.
4.	A	A three-foot handle moves through a distance of about 900 feet to raise the top of the jack one foot. Therefore, the power factor would be about 900 to 1.
5.	B	It takes 4 turns of the jack handle to raise the top 1 inch because each turn of the screw makes the top move $\frac{1}{4}$ inch.
6.	C	The speed ratio of this jack is 1 to 600 because the load moves one six-hundredths (1/600) of the distance the jack handle moves.

Exercise 27 - Brick Counting

Part 1

Drill 1

1.	6	5.	7	9.	8
2.	12	6.	12	10.	14
3.	8	7.	13	11.	9
4.	10	8.	13	12.	17

Drill 2

1.	4	5.	9	9.	13
2.	7	6.	14	10.	11
3.	6	7.	10	11.	12
4.	5	8.	15	12.	16

Part 2

Drill 1

	A	B	C		A	B	C
1.	3	6	4	4.	2	3	2
2.	3	3	4	5.	3	4	5
3.	1	3	4	6.	4	4	5

Drill 2

	A	B	C		A	B	C
1.	0	3	4	4.	3	4	2
2.	3	2	6	5.	4	3	2
3.	5	5	2	6.	1	3	3

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Exercise 28 - Technical Comprehension

Part 1 - Piston, Connecting Rod, and Crankshaft

Question	Answer	Explanation
1.	D	The piston pin does not move in a circle because it goes straight up and down with the piston inside the cylinder.
2.	A	The cylinder does not move at all because it is part of the engine block.
3.	B	The lower rod bearing cap is held by bolts and nuts so that the bearing can be replaced and the piston can be removed from the cylinder for replacement of the piston rings.
4.	A	The crankpin is up all the way when the piston is up in the cylinder.
5.	C	In a six-cylinder engine there are six crankpins.

Part 2 - Two-Stroke-Cycle Diesel Engine

1.	A.	A complete cycle of this type of engine takes only one turn of the crankshaft, so the piston will go up only once for each complete cycle.
2.	D	Scavenging takes place when the piston is at the bottom of its stroke and the intake ports are uncovered. Air blows in these ports and forces the burned exhaust gases out the exhaust valve at the top of the cylinder.
3.	B	Fuel enters the cylinder on the injection stroke or when the piston is just at the top of its stroke.
4.	A	Arrows in each picture show that the crankshaft rotates clockwise.
5.	C	When air is compressed into a space about 1/20 of its original size, it becomes very hot. This ignites the fuel-and-air mixture.
6.	C	Air is forced into the cylinder by a blower. This air also forces out the exhaust gases on the exhaust stroke.

ANSWERS

Exercise 28 - Technical Comprehension

Part 3 - Magnetic Circuit Breaker

Question	Answer	Explanation
1.	B	The dashed lines indicate the normal position of the armature holding the breaker points together.
2.	C	When the current increases, the electromagnet becomes stronger and pulls back the armature. This allows the spring to separate the breaker points.
3.	D	The function of the armature is simply to hold the breaker points together. No current flows through it.
4.	A	A series circuit must be used in this device to break the connection.
5.	C	The contact bar carries the upper breaker point.
6.	B	The armature spring holds the armature to the left so that the shoulder will keep the contact bar down until an overload pulls it to the right.

Part 4 - Gear Train

1.	D	Of these pairs of gears only A and C turn in the same direction.
2.	A	Gears E and F are on the same shaft. As gears F and G mesh externally they turn in opposite directions.
3.	B	The gears between D and G rotate in the opposite direction.
4.	A	Since gear B has fewer teeth than gear A, it must rotate faster.
5.	C	Gear G is on the slow end of this gear train.
6.	E	If gear B turns faster than gear A, it must have less power.

Exercise 29 - 3-D Visualization--Part 4

Drill 1		Drill 2		Drill 3	
1. B	4. C	7. A	10. A	13. B	16. C
2. A	5. A	8. C	11. C	14. A	17. E
3. E	6. C	9. E	12. B	15. D	18. A

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Exercise 30 - Technical Comprehension

Part 1 - External Contracting Brake

Question	Answer	Explanation
1.	A	As the handle moves to the left it pulls the brake band tighter around the brake drum.
2.	B	Movement to the right eases the brake pressure.
3.	D	The longer the brake lever the more leverage is available to tighten the brake band.
4.	A	Every lever must have a fulcrum. This is the point about which a lever turns.

Part 2 - Plunger-Type Fuel Pump

1.	B	As the plunger moves down it creates a suction, which brings in more fuel.
2.	B	When the plunger moves down, the inlet valve opens, which allows oil to come into the plunger chamber.
3.	A	The strength of the spring determines the pressure of the fuel delivered to the injection pump.
4.	D	The pumping action comes from the plunger spring, not the push rod.
5.	B	The outlet valve closes.

Part 3 - Four-Pole A C Generator

1.	D	The brushes contact the slip rings to pick up the current pulses.
2.	B	The slip rings must turn the same direction as the magnet loop.
3.	A	The lines of force are indicated by arrows in the magnetic field.
4.	D	With four poles the current changes polarity four times. With six poles it would change six times.
5.	C	The brushes are attached to the generator case and do not turn.

Part 4 - Automobile Fan Belt

1.	A	If nut A is loosened, the generator may move toward the engine block and allow the fan belt to loosen.
2.	B	Nut B holds on the fan. If it becomes loose, the fan may fall off.
3.	D	Nut C is one of the nuts holding the timing gear cover in place.
4.	C	Nut D and the bolt attached hold the rear of the generator in place. If nut D loosens or falls out, the rear of the generator will fall down or vibrate.