

Mock Exam - mix

Applied Science

- 1 When an incandescent light bulb is turned on, most of the electrical energy is transformed into thermal energy.

A 40-W incandescent light bulb provides 120 J of luminous energy when it is turned on for 1 minute.

What is the energy efficiency of this incandescent light bulb?

- A) 3%
- B) 5%
- C) 20%
- D) 33.3%

- 2 Which of the following statements is TRUE regarding electricity production using nuclear energy?

- A) Nuclear energy uses a renewable resource from the hydrosphere.
- B) Nuclear energy produces greenhouse gases such as carbon dioxide, CO₂.
- C) Nuclear energy uses a nonrenewable resource from the lithosphere.
- D) Nuclear energy requires large amounts of uranium.

- 3 Different factors play a role in the distribution of aquatic and terrestrial biomes. What factors are common to both aquatic and terrestrial biomes?

- A) Winds and precipitation
- B) Solar energy and winds
- C) Solar energy and temperature
- D) Temperature and precipitation

- 4 Matter and energy flow through an ecosystem.

Which of the following food chains involves the greatest loss of energy?

- A) Corn → Human
- B) Flower → Insect → Frog
- C) Grass → Hare → Fox
- D) Corn → Insect → Crow → Lynx

- 5 You rub a balloon on your hair in order to stick the balloon on the wall.

Which of the following statements is TRUE?

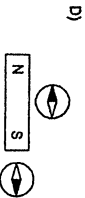
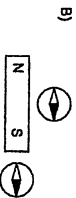
- A) When rubbed together, both the balloon and your hair become positively charged.
- B) When rubbed together, both the balloon and your hair become negatively charged.
- C) When rubbed together, the balloon remains neutral and your hair becomes negatively charged.
- D) When rubbed together, the balloon becomes negatively charged and your hair becomes positively charged.

- 6 A flat iron used on hair for 8 minutes consumes 576 000 J of electrical energy.

What is the power of this iron?

- A) 20 W
- B) 72 W
- C) 1200 W
- D) 72 000 W

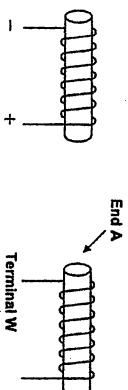
- 7 Which diagram shows the needles on the 2 compasses pointing in the correct direction when they are placed near a bar magnet?



- 8 The following diagram shows two current-bearing electromagnets.

Electromagnet 1

Electromagnet 2



Electromagnets 1 and 2 repel each other.

What is the polarity of Terminal W and what pole is formed at End A?

- A) Positive polarity; North pole
- B) Positive polarity; South pole
- C) Negative polarity; North pole
- D) Negative polarity; South pole

- 9 Below is the circuit diagram for a game that operates on three 1.5-V batteries.



You want to change this electrical circuit so that the game can operate on only one 9-V battery instead of three 1.5-V batteries, while keeping the same 2-Ω resistor.

How would this change affect the current intensity in the electrical circuit?

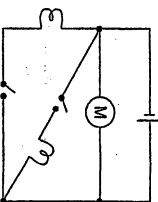
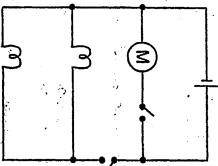
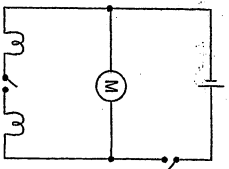
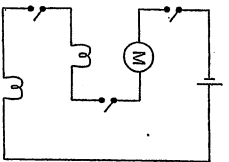
- A) The current intensity would be higher.
- B) The current intensity would be lower.
- C) The current intensity would be zero.
- D) The current intensity would be the same.

- 10 A battery that provides 5400 J of energy at a current intensity of 0.25 A is used to operate a child's electric vehicle for 30 minutes.

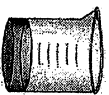
What is the voltage of this battery?

- A) 0.08 V
- B) 3 V
- C) 12 V
- D) 720 V

11) In which one of the following electrical circuits can each of the two light bulbs be turned on separately?



12) Which of the following four statements correctly describes the difference between the amounts of thermal energy in the water in the two beakers below?



- A) There is more thermal energy in 200 mL of water because the molecules have less room to move around.
 B) Both volumes of water have the same amount of thermal energy because their temperature is the same.
 C) There is more thermal energy in 400 mL of water because there are more water molecules.
 D) There is less thermal energy in 400 mL of water because the molecules must travel a greater distance before colliding with one another.

13) You blow air underneath a sheet of folded paper as illustrated below.



A)

Below the Sheet of Paper	
Pressure	Decreases
Speed	Decreases

B)

Below the Sheet of Paper	
Pressure	Increases
Speed	Increases

C)

Below the Sheet of Paper	
Pressure	Decreases
Speed	Increases

D)

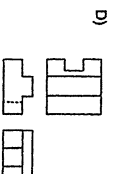
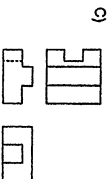
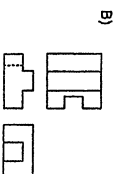
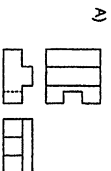
Below the Sheet of Paper	
Pressure	Increases
Speed	Decreases

14)

Which of the following statements explains why a parachutist falls at a constant speed a few minutes after his parachute opens?

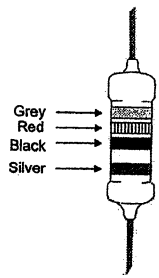
- A) The force of the air trapped under the parachute pushes the parachutist upward.
 B) The force of the air trapped under the parachute is greater than the parachutist's weight.
 C) The force of the air trapped under the parachute is equal to the force exerted by the parachutist's weight.
 D) The force of the air trapped under the parachute is less than the parachutist's weight.

15) The three-dimensional representation of an object is illustrated below.



Which multiview orthogonal projection corresponds to this object?

16 The following diagram shows a resistor that can be used in an electrical circuit.



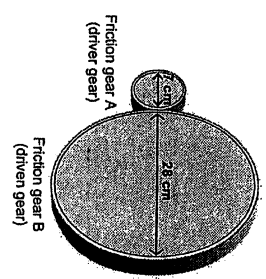
The following colour code is used to determine the value of this resistor.

Digit	0	1	2	3	4	5	6	7	8	9
Black	Brown	Red	Orange	Yellow	Green	Blue	Violet	Grey	White	Gold
Multiplier	1	10	10 ²	10 ³	10 ⁴	10 ⁵	10 ⁶			
Tolerance (%)	20									5

What is the value of this resistor?

- A) 82 Ω ± 10%
- B) 820 Ω ± 10%
- C) 1002 Ω ± 8%
- D) 100 × 10² Ω ± 8%

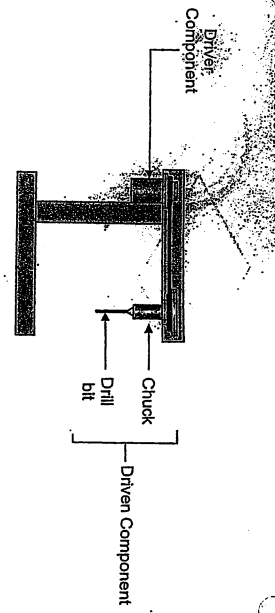
17 Illustrated below is a speed change system consisting of two friction gears.



Unfortunately, the gears in this system sometimes slip on each other. The problem can be solved by replacing the friction gears with toothed gears.

- What combination of toothed gears provides a system equivalent to this friction gear system?
- A) A 60-tooth gear replacing friction gear A and a 15-tooth gear replacing friction gear B
 - B) A 15-tooth gear replacing friction gear A and a 60-tooth gear replacing friction gear B
 - C) A 48-tooth gear replacing friction gear A and a 16-tooth gear replacing friction gear B
 - D) A 16-tooth gear replacing friction gear A and a 48-tooth gear replacing friction gear B

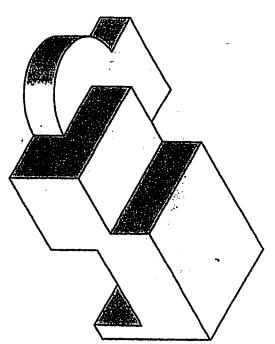
18 Drill presses used in technical and workshops include a belt-and-pulley system that brings about a change in speed, as motion is transmitted between the driver component and the driven component.



In which one of the following situations will the drill bit rotate fastest?

- A)
- B)
- C)
- D)

19 A play will be presented at your school. A student's three-dimensional representation of the stage is illustrated below.



Which diagram corresponds to the right-side view of the orthogonal projection of this stage?

- A)
- B)
- C)
- D)

Questions
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$\frac{19}{19} \times 100 = \underline{\quad} \%$