Implications and Deductions Worksheet 1

Question 1

Suppose n is an integer which is a multiple of 12.
Which of the following is a valid deduction?

A n is a multiple of 24.

B n is divisible by 3.

C n is prime.

D $n = 12$.

Question 2

Priya is in a train travelling from London to Edinburgh.
Which conclusion is **not** validly deduced from this statement?

A Priya is on a train.

B There is at least one train being used for the journey.

C Priya is in Edinburgh.

D Priya is in the UK.

Question 3

Suppose x is a real number and $x > 7$.
Which of the following is an implication of this statement?

A $x = 8$.

B $x < 10$.

C $x^2 < 49$.

D $x > 0$.

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Question 4

Every student in Room A has handed in the form. Maya is a student in Room A.
What can be validly concluded?

A Maya has handed in the form.

B Every student who handed in the form is in Room A.

C Maya is the only student in Room A.

D No student outside Room A has handed in the form.

Question 5

Suppose m is an odd integer.
Which of the following is **not** a valid deduction?

A $m + 1$ is even.

B m^2 is odd.

C $2m$ is even.

D m is positive.

Question 6

If the alarm is sounding, then the building must be evacuated. The alarm is sounding.
Which deduction is valid?

A There must be a fire.

B The building must be evacuated.

C Everyone has already left the building.

D The alarm is broken.

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Question 7

Let a and b be positive real numbers with $a > b$.
Which conclusion follows?

A $a - b > 0$.

B $a + b < 0$.

C $b > a$.

D $\dfrac{a}{b} < 1$.

Question 8

All premium tickets include a seat reservation. Liam has a premium ticket.
Which of the following does **not** follow?

A Liam has a ticket.

B Liam's ticket includes a seat reservation.

C At least one premium ticket exists.

D Liam is travelling first class.

Question 9

Suppose k is an integer and k^2 is divisible by 9.
Which of the following can be deduced?

A k is divisible by 3.

B k is divisible by 9.

C k is even.

D $k = 3$.

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Question 10

If a bakery opens before 7 am, then it sells breakfast pastries. Today the bakery opened at 6:30 am. Which implication is valid?

A The bakery sells breakfast pastries today.

B The bakery closes early today.

C The bakery sells only breakfast pastries today.

D The bakery opens before 7 am every day.

Question 11

Suppose $x = 2$.
Which of the following is **not** a valid conclusion?

A $x^2 = 4$.

B $x + 1 = 3$.

C $(x - 1)x = 2(x - 1)$.

D x is the only value satisfying $(x - 1)x = 2(x - 1)$.

Question 12

If a laptop is plugged in and switched on, then its charging light is on. My laptop is plugged in and switched on.
Which statement cannot be validly deduced?

A The laptop is plugged in.

B The laptop is switched on.

C The laptop's charging light is on.

D The laptop's battery is full.

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Question 13

Suppose $y = 3x + 1$ and $x = 2$.
Which conclusion is forced?

A $y = 6$.

B $x = 3$.

C $y = 7$.

D $y > 10$.

Question 14

Every book on the top shelf is a history book. The blue book is on the top shelf.
Which of the following is a valid deduction?

A The blue book is a history book.

B Every history book is on the top shelf.

C The blue book is the only book on the top shelf.

D No book below the top shelf is a history book.

Question 15

For a real number x, suppose $x^2 > 16$.
Which conclusion is **not** validly deduced?

A $x > 4$ or $x < -4$.

B $|x| > 4$.

C $x > 4$.

D $x \neq 0$.

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Question 16

All cats in the shelter have been vaccinated. Coco is a cat in the shelter.
Which conclusion does **not** follow?

A Coco has been vaccinated.

B Coco is in the shelter.

C Coco is a cat.

D Every vaccinated animal is a cat.

Question 17

Suppose $A \Rightarrow B$ and $B \Rightarrow C$. We also know that A is true.
Which deduction is valid?

A C is true.

B B is false.

C $C \Rightarrow A$ is true.

D A is false.

Question 18

If a team wins the final, then it receives a trophy. If a team receives a trophy, then it appears in the newspaper. The team won the final.
Which conclusion follows from the chain of implications?

A The team appears in the newspaper.

B Every team in the newspaper won the final.

C The team won every match this season.

D The newspaper gives trophies to teams.

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Question 19

Suppose p is a prime number greater than 2.
Which of the following is **not** a valid implication?

A p is odd.

B $p \geq 3$.

C p is not divisible by 2.

D $p = 3$.

Question 20

If a shop sells only vegetarian sandwiches, then every sandwich it sells contains no meat. Green Deli sells only vegetarian sandwiches.
Which conclusion can be deduced?

A Green Deli sells no drinks.

B Every sandwich Green Deli sells contains no meat.

C Every vegetarian sandwich is sold by Green Deli.

D Green Deli sells every type of sandwich.