

## Implication Equivalent Forms Worksheet 2

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### Question 1

For a real number  $x$ ,  $x^2 = 9$  is necessary for  $x = 3$ .

Which statement is equivalent?

- A If  $x^2 = 9$ , then  $x = 3$ .
- B  $x = 3$  only if  $x^2 = 9$ .
- C  $x^2 = 9$  is sufficient for  $x = 3$ .
- D  $x = 3$  is necessary for  $x^2 = 9$ .

### Question 2

If a parcel is marked FRAGILE, then it is carried by hand.

Which of the following is **not** equivalent to this statement?

- A Being marked FRAGILE is sufficient for being carried by hand.
- B Being carried by hand is necessary for being marked FRAGILE.
- C A parcel is marked FRAGILE only if it is carried by hand.
- D Being marked FRAGILE is necessary for being carried by hand.

### Question 3

A token shining blue is an inevitable consequence of it being a moon-token.

Which statement says the same thing?

- A If a token shines blue, then it is a moon-token.
- B Being a moon-token is necessary for shining blue.
- C Shining blue is necessary for being a moon-token.
- D A token is a moon-token only if it does not shine blue.

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### Question 4

For a triangle, having three equal sides is sufficient for having at least two equal sides.

Which of the following is equivalent?

- A Having at least two equal sides is necessary for having three equal sides.
- B Having three equal sides is necessary for having at least two equal sides.
- C A triangle has at least two equal sides only if it has three equal sides.
- D If a triangle has at least two equal sides, then it has three equal sides.

### Question 5

A document is approved only if it has a green signature.

Which statement says the same thing?

- A If a document has a green signature, then it is approved.
- B Being approved is necessary for having a green signature.
- C Having a green signature is sufficient for being approved.
- D If a document is approved, then it has a green signature.

### Question 6

For an integer  $n$ ,  $n$  is divisible by 12 only if  $n$  is divisible by 3.

Which statement is **not** equivalent?

- A Being divisible by 3 is necessary for being divisible by 12.
- B Being divisible by 12 is sufficient for being divisible by 3.
- C If  $n$  is divisible by 12, then  $n$  is divisible by 3.
- D Being divisible by 3 is sufficient for being divisible by 12.

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### Question 7

If the mirror cracks, then the alarm flashes.

Which of the following is equivalent to this statement?

- A The alarm flashing is sufficient for the mirror cracking.
- B The mirror cracking is necessary for the alarm flashing.
- C The alarm flashing is necessary for the mirror cracking.
- D The alarm flashes only if the mirror cracks.

### Question 8

Being in the set  $S$  is necessary for satisfying rule  $R$ .

Which statement is equivalent?

- A If an object is in the set  $S$ , then it satisfies rule  $R$ .
- B Satisfying rule  $R$  is sufficient for being in the set  $S$ .
- C An object is in the set  $S$  only if it satisfies rule  $R$ .
- D Being in the set  $S$  is an inevitable consequence of not satisfying rule  $R$ .

### Question 9

If a creature is a flom, then it has silver eyelashes.

Which of the following is **not** equivalent to this statement?

- A Being a flom is sufficient for having silver eyelashes.
- B Having silver eyelashes is necessary for being a flom.
- C Having silver eyelashes only if being a flom.
- D Having silver eyelashes is an inevitable consequence of being a flom.

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### Question 10

For a real number  $y$ ,  $y > 5$  is a sufficient condition for  $y + 2 > 6$ .

Which statement says the same thing?

- A  $y + 2 > 6$  is necessary for  $y > 5$ .
- B  $y > 5$  is necessary for  $y + 2 > 6$ .
- C If  $y + 2 > 6$ , then  $y > 5$ .
- D  $y + 2 > 6$  only if  $y > 5$ .

### Question 11

Every time the lantern is lit, the bridge appears.

Which statement is equivalent?

- A The lantern being lit is necessary for the bridge appearing.
- B The lantern is lit only if the bridge appears.
- C The bridge appearing is sufficient for the lantern being lit.
- D If the bridge appears, then the lantern is lit.

### Question 12

Receiving a silver pass is necessary for entering Gate 9.

Which of the following is **not** equivalent?

- A If someone enters Gate 9, then they have received a silver pass.
- B Entering Gate 9 is sufficient for receiving a silver pass.
- C Receiving a silver pass is an inevitable consequence of entering Gate 9.
- D Receiving a silver pass is sufficient for entering Gate 9.

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### Question 13

A line being vertical implies that the line is not horizontal.

Which statement is equivalent?

- A Being not horizontal is necessary for being vertical.
- B Being vertical is necessary for being not horizontal.
- C Being not horizontal is sufficient for being vertical.
- D A line is vertical only if it is horizontal.

### Question 14

Being selected for Team A is an inevitable consequence of scoring above 90.

Which of the following is **not** equivalent?

- A If a player scores above 90, then the player is selected for Team A.
- B Being selected for Team A is necessary for scoring above 90.
- C Scoring above 90 only if being selected for Team A.
- D Scoring above 90 is necessary for being selected for Team A.

### Question 15

To be a crindle, an object must hum at midnight.

Which statement says the same thing?

- A If an object hums at midnight, then it is a crindle.
- B If an object is a crindle, then it hums at midnight.
- C Being a crindle is necessary for humming at midnight.
- D Humming at midnight is sufficient for being a crindle.

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### Question 16

For a positive integer  $n$ , if  $n$  is a multiple of 18, then  $n$  is not prime.

Which statement is equivalent?

- A Being not prime is necessary for being a multiple of 18.
- B Being a multiple of 18 is necessary for being not prime.
- C Being not prime is sufficient for being a multiple of 18.
- D  $n$  is a multiple of 18 only if  $n$  is prime.

### Question 17

A painting being in Room C is sufficient for it to have a barcode.

Which statement is **not** equivalent?

- A If a painting is in Room C, then it has a barcode.
- B Having a barcode is necessary for being in Room C.
- C A painting is in Room C only if it has a barcode.
- D A painting has a barcode only if it is in Room C.

### Question 18

A polygon is a square only if it has at least one pair of parallel sides.

Which statement is equivalent?

- A If a polygon is a square, then it has at least one pair of parallel sides.
- B Having at least one pair of parallel sides is sufficient for being a square.
- C Being a square is necessary for having at least one pair of parallel sides.
- D If a polygon has at least one pair of parallel sides, then it is a square.

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### Question 19

If the password is correct, then the screen unlocks.

Which statement says the same thing?

- A The password being correct is necessary for the screen unlocking.
- B The screen unlocking is sufficient for the password being correct.
- C The screen unlocking is an inevitable consequence of the password being correct.
- D The screen unlocks only if the password is correct.

### Question 20

For real numbers  $a$  and  $b$ , having  $a + b = 10$  is necessary for having  $a = 4$  and  $b = 6$ .

Which statement is **not** equivalent?

- A If  $a = 4$  and  $b = 6$ , then  $a + b = 10$ .
- B Having  $a = 4$  and  $b = 6$  is sufficient for having  $a + b = 10$ .
- C Having  $a = 4$  and  $b = 6$  only if having  $a + b = 10$ .
- D Having  $a + b = 10$  is sufficient for having  $a = 4$  and  $b = 6$ .