Negation and Quantifiers Worksheet 1 Solutions

Question 1

The statement says that every integer has the property of being even. To negate a *for all* statement, we need one counterexample. So the negation is that at least one integer is not even.
The answer is **B**.

Question 2

The statement says that one or more students submitted the form. Its negation is that zero students submitted the form, which means none of the students submitted it.
The answer is **C**.

Question 3

Negating a *there exists* statement gives a *for all* statement. The inside statement $x^2 < 0$ negates to $x^2 \geq 0$.
The answer is **A**.

Question 4

The statement says that zero blue cards have a star. Its negation is that the number of blue cards with a star is not zero, so at least one blue card has a star.
The answer is **B**.

Question 5

To negate a *for all* statement, it is enough to say that at least one object in the collection fails the property. So the negation is that at least one triangle does not have three sides.
The answer is **C**.

Question 6

The original statement says that one circle with radius 5 can be found. Its negation says that no such circle can be found, or equivalently every circle has radius not equal to 5.
The answer is **A**.

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Question 7

The negation of *at least one* is *none*. So the negation is that none of the moons of Planet Zor are green.
The answer is **C**.

Question 8

If none of the password codes end in 7, then the opposite is that this fails for at least one code. So at least one password code ends in 7.
The answer is **A**.

Question 9

A *for all* statement is negated by finding at least one case where the inside statement fails. Here that means at least one point on line l does not have y-coordinate 2.
The answer is **C**.

Question 10

The inside statement *more than* 400 *pages* negates to *at most* 400 *pages*. Since the original uses *there exists*, the negation uses *for all*.
The answer is **A**.

Question 11

The negation of *for all positive integers* is *at least one positive integer*. The inside statement $n + 1$ is positive becomes $n + 1$ is not positive.
The answer is **A**.

Question 12

The statement says that at least one rectangle has four equal side lengths. Its negation says that every rectangle fails this property.
The answer is **C**.

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Question 13

The statement says that at least one customer satisfies *ordered tea or coffee*. Its negation is that no customer satisfies this, so none of the customers ordered tea or coffee.
The answer is **A**.

Question 14

The original says there are zero silver robots that both blink and whistle. The negation is that at least one silver robot does both.
The answer is **A**.

Question 15

First swap *for all* to *at least one*. Then negate the inside statement. The negation of *odd or a multiple of* 3 is *not odd and not a multiple of* 3.
The answer is **A**.

Question 16

Negating *there exists* gives *for all*. The inside statement *speaks French and German* negates to *does not speak French or does not speak German*.
The answer is **A**.

Question 17

The statement claims that there is at least one tile with both properties. The negation is that no tile has both properties at the same time.
The answer is **A**.

Question 18

The negation of *none* is *at least one*. So the negation is that at least one glimwick hums at night.
The answer is **C**.

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Question 19

The negation of $x \leq 10$ is $x > 10$. Since the original statement uses *for all*, the negation says at least one number in the list is greater than 10.
The answer is **A**.

Question 20

Negating *there exists* gives *for all*. The negation of *empty or cracked* is *not empty and not cracked*.
The answer is **A**.