1

Can you please check the question: I guess it should read "for any non zero a and b"

$|a|=-a$ means that $a<0$ and $|ab|=ab$ means that $ab>0$, so they have the same sign and since $a<0$ then $b<0$ too.

So, we have $a<0$ and $b<0$.

Now, $b-4=b+(-4)=negative+negative=negative$, so $|b-4|=-(b-4)$;
$ab-b=positive-negative=positive+positive=positive$, so $|ab-b|=+(ab-b)$;

Hence $|b-4|+|ab-b|=-(b-4)+(ab-b)=ab-2b+4$.

Answer: D.

2

If |a+b|=|a-b|, then a*b must be equal to:
A. 1
B. -1
C. 0
D. 2
E. -2

Square both sides: $(a+b)^2=(a-b)^2$ --> $a^2+2ab+b^2=a^2-2ab+b^2$ --> $4ab=0$ --> $ab=0$.

Answer: C.

3

Algebraic approach:

The greatest possible value of the expression $12-|32-7n|$ will be for the least value of $|32-7n|$. Now, the least possible value of an absolute value is 0 --> $|32-7n|=0$ --> $n=\frac{32}{7}=4\frac{4}{7}$, but we are told that n is an integer so the least value of $|32-7n|$ will be for $n=5$ (the closest integer value to $4\frac{4}{7}$) --> $n=5$ --> $12-|32-7n|=12-3=9$.

Answer: D.

4

Neither method needs to be used here. Just think of the definition of mod we use to remove the mod sign.

|x| = x if x >= 0 and |x| = -x if x < 0

We don't know whether a and b are positive or negative. |a|=|b| when absolute values of both a and b are the same. The signs can be different or same. There are 4 cases: a and b are positive, a is positive b is negative, a is negative b is positive, a and b are negative.
For a must be true question, the relation should hold in every case.

1. a=b
Doesn't hold when a and b have opposite signs. e.g. a = 5, b= -5

2.|a|=-b
Doesn't hold when b is positive because -b will become negative while left hand side is always non negative. e.g. a = 5, b = 5
$|5|\neq-5$

3.-a=-b
Doesn't hold when a and b have opposite signs. e.g. a = 5, b = -5
$-5\neq5$

Answer (E)

$|a| = |b|$ basically means that the distance between a and zero on the number line is the same as the distance between b and zero on the number line.

Thus either $a = b$ (notice that it's the same as $-a = -b$) or $a = -b$ (notice that it's the same as $-a = b$).