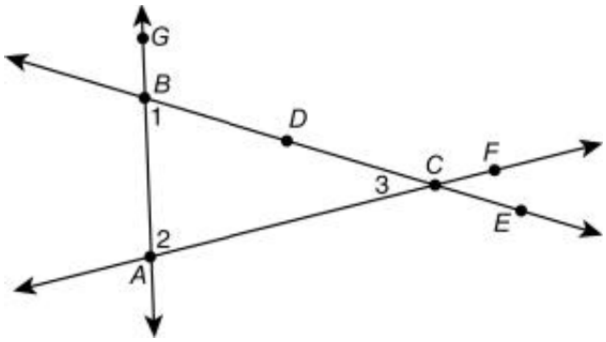
Math 30 Geometry – Chapter 1 Test Solutions

Use the figure to fill in the blanks for 1-7.



1. If $m\angle 1=80°$, then $m\angle GBD=$ 100°

2. $\angle 3 + m\angle DCF =$ 180°

3. If $m\angle 3=35°$, then $m\angle ECF=$ 35°

4. *D* is a point on what two line segments?
$\overline{BC}$ and $\overline{BC}$

5. $BC+CE =$ $\overline{BE}$.

6. *C* is the vertex of $\angle 3$.

7. If $DE = 5$ and $CE = 2$, then $DC =$ 3**.**

8. Use inductive reasoning to give the next element in the list 3, 5, 9, 15,…

ANS: A pattern shown in this sequence is that the *n*th number in the sequence is $2(n – 1)$ larger than the previous number. For example, 5 is the 2nd number and it is $2(2 – 1) = 2$ larger than 3, while 9 is the 3rd number and it is $2(3 – 1) = 4$ larger than 5 and 15 is $2(4 – 1) = 6$ larger than 9. So the 5th number (the next number) would be $2(5 – 1) = 8$ larger than 15, that is, 23.

9. True or False: The term ***point*** used in our axiomatic system for geometry of is undefined.

ANS: Strangely, this is true. There is a small number of undefined terms that we need to get started, and "point" is one of them.

10. Definition 4 for ***point*** in Merriam Webster's 11th Collegiate Dictionary is as follows:

> 4 a : a geometric element that has zero dimensions and a location determinable by an ordered set of coordinates b (1) : a narrowly localized place having a precisely indicated position *walked to a point 50 yards north of the building* (2) : a particular place : LOCALITY *have come from distant points* c (1) : an exact moment *at this point I was interrupted* (2) : a time interval immediately before something indicated : VERGE *at the point of death* d (1) : a particular step, stage, or degree in development *had reached the point where nothing seemed to matter anymore* (2) : a definite position in a scale

Do any of these match the definition for point in our axiomatic system for geometry? If so, which? If not, why not?

ANS: Well, no, since it is an undefined term, yet we think of a point as an object which determines a position but has no dimension. And this is most like definition 4a above.

10. Give an example of induction reasoning.
ANS: Trees grow, dogs grow, people grow, so, all living things grow.

11. How is a postulate different from a definition?

ANS: Postulates are statements about undefined terms and definition that are accepted without the verification of a proof, whereas definitions are statements using either undefined terms or previously defined terms that will give meaning to new terms that will be used in a system.

12. Can the conclusion below be deduced logically from the premises? Why or why not?
Premise: Don is a math major.
Premise: Sue is a math major.
Premise: Beth is a math major.
Conclusion: All students are math majors.
ANS: No, it may be *in*duced, but it is not *de*duced.

13. How many planes pass through three distinct points not on the same line? How do you know?
ANS: It is a basic postulate that three distinct points not on the same line define a unique plane.

14. Use the fact that the comparison operator, ">" is transitive to complete the following:
If $2 > w$ and $w > x$, then __$2 > x$____.

15. Find the supplement of 16 °53'**.**
ANS: 180° – 16 ° 53' = 163° 7'

16. Give the converse of the statement, "If it is a triangle, then it is a polygon."
ANS: If it is a polygon, then it is a triangle. (note that the converse is not necessarily true.)

17. Give the negation of the statement, "All dogs are above average."
ANS: All dogs are not above average….or better, "Not all dogs are above average."

18. Give the inverse of the statement, "If it is an orangutan, then it is orange."
ANS: If it is not an orangutan, then it is not orange.

19. Give the contrapositive of the statement, "If it rains, then the creek will rise."
ANS: If the creek doesn't rise, then it won't rain.

20. If $\overline{AB}$ cuts $\angle CAD$ into two congruent angles, then $\overline{AB}$ is called the _angle bisector__**.**

21. Match the following statements and reasons to complete the proof of:
Theorem: If you set aside time, then you will be able to accomplish more.
Premise 1: If you exercise, your health will improve.
Premise 2: If your health improves, you will be able to accomplish more.
Premise 3: If you set aside time, you can exercise.

Proof: STATEMENTS REASONS

1. If you set aside time, you can exercise. 1. premise 3

2. If you exercise, your health will improve. 2. premise 1

3. If your health improves, you will be able to accomplish more. 3. premise 2

4. If you set aside time, then you will be able to accomplish more. 4. Transitive Postulate

22. Match the following reasons to complete the proof. Reasons may be used more than once.
Given: $\angle 1$ and $\angle 2$ are supplementary
$\angle 1$ and $\angle 3$ are vertical angles
$\angle 2$ and $\angle 4$ are vertical angles
Prove: $\angle 3$ and $\angle 4$ are supplementary

Proof:

STATEMENTS	REASONS
1. $\angle 1$ and $\angle 2$ are supplementary	1. Given
2. $m\angle 1+m\angle 2 = 180°$	2. Definition of supplementary
3. $\angle 1$ and $\angle 3$ are vertical angles	3. Given
4. $\angle 1 \cong \angle 3$	4. Vertical $\angle$s are congruent (theorem)
5. $m\angle 1 = m\angle 3$	5. Congruent angles have equal measure.
6. $\angle 2$and $\angle 4$ are vertical angles	6. Given
7. $\angle 2 \cong \angle 4$	7. Vertical $\angle$s are congruent (theorem)
8. $m\angle 2 = m\angle 4$	8. Congruent angles have equal measure
9. $m\angle 3+m\angle 4 = 180°$	9. Substitution
10. $\angle 3$ and $\angle 4$ are supplementary	10. Definition of supplementary