Position Needs an Origin and a Direction

"200 m" means nothing until you say from where and which way. Position is a signed number with a unit, measured from a chosen origin.

Name: Date: Score: ____ / 19

A. Fill in the blanks

1. The fixed point from which position is measured is called the ____.

2. Positions on the side opposite to the chosen positive direction are ____.

3. A position is written as a sign, a number and a ____.

4. Changing the origin changes positions but not the ____.

B. True or False

5. "The shop is 200 m away" fully describes the shop's position. True / False

6. A position of −150 m means the object is on the negative side of the origin. True / False

7. Moving the origin changes the displacement between two places. True / False

8. The origin itself is at position 0. True / False

C. Assertion and reason

9. Assertion (A): A position needs a sign.
Reason (R): The sign tells on which side of the origin the object lies.

(a) Both A and R are true, and R explains A
(b) Both A and R are true, but R does not explain A
(c) A is true, R is false
(d) A is false, R is true

Answer: _____

10. Assertion (A): The displacement from home to shop is +200 m for any origin.
Reason (R): Displacement is the difference of two positions measured from the same origin.

(a) Both A and R are true, and R explains A
(b) Both A and R are true, but R does not explain A
(c) A is true, R is false
(d) A is false, R is true

Answer: _____

D. Choose the correct option

11. Home is the origin, right is positive. A school 150 m to the left is at:

(a) +150 m
(b) −150 m
(c) 0
(d) 150

Answer: _____

12. With home as origin the shop is at +200 m. With the school (−150 m) as origin, the shop is at:

(a) +50 m
(b) +200 m
(c) +350 m
(d) −350 m

Answer: _____

13. Which does not depend on the choice of origin?

(a) position of home
(b) position of shop
(c) displacement home → shop
(d) position of school

Answer: _____

14. To describe a position on a straight road you need:

(a) only a number
(b) a number and a unit
(c) an origin, a direction, a number and a unit
(d) only a direction

Answer: _____

E. Numerical problems

15. With home as origin, the shop is at +200 m and the school at −150 m. Find the distance between the school and the shop.

16. Take the school as origin. Find the positions of home and shop, and the displacement home → shop.

F. Short answer questions

17. Why is "200 m" not a complete position?

18. Explain why changing the origin does not change displacement.

G. Match the columns

19. Match each item in Column A with the correct item in Column B.

Column A	Column B	Your answer
1. Origin	(a) 150 m on the negative side	1 → ____
2. +200 m	(b) Displacement	2 → ____
3. −150 m	(c) 200 m on the positive side	3 → ____
4. Final − initial position	(d) Position 0	4 → ____

Detailed solutions

1. origin

2. negative

3. unit

4. displacement

5. False. It needs an origin and a direction.

6. True. The sign gives the side.

7. False. Displacement = final − initial; the shift cancels.

8. True. Every position is measured from it.

9. (a) R explains A.

10. (a) Shifting the origin shifts both positions equally.

11. (b) −150 m. Left is the negative direction.

12. (c) +350 m. 200 − (−150) = 350.

13. (c) displacement home → shop. It is a difference of positions.

14. (c) an origin, a direction, a number and a unit. All of these.

15. Distance = 200 − (−150). **Answer: 350 m**

16. Home = 0 − (−150) = +150 m; Shop = 200 − (−150) = +350 m; Displacement = 350 − 150. **Answer: Home +150 m, shop +350 m, displacement +200 m**

17. It does not say from where (origin) or in which direction (sign); the same 200 m could be left or right of any point.

18. Moving the origin adds the same amount to every position, so the difference between two positions (the displacement) stays the same.

19. 1 → (d), 2 → (c), 3 → (a), 4 → (b). Each item matches its meaning.