

Word Problems Worksheet – Set 1

Chapter 10: The Other Side of Zero | Real-Life Word Problems (Difficulty level 7/10)

Name:	Class:	Section:
Date:	Roll No.:	Marks (out of 30):

Instructions: Solve each problem step by step. Write the integer expression you use. Each problem carries 3 marks.

Solve the following word problems (10 × 3 = 30 marks)

- Ananya lives in a 30-storey apartment in Mumbai, on Floor +16. One morning she takes the lift down to the parking basement on Floor -2 to collect her cycle. Then she goes straight up to the terrace on Floor +24 to dry her clothes. (a) How many floors does the lift travel down and then up? (b) Write her total movement from her flat to the terrace as an integer and verify it using Target – Starting.
- At 6 a.m. the temperature in Tawang (Arunachal Pradesh) was -7°C . By 2 p.m. it had risen by 13°C , and by midnight it had fallen by 16°C from the 2 p.m. reading. (a) Find the temperatures at 2 p.m. and at midnight. (b) Was midnight colder or warmer than 6 a.m., and by how many degrees? (c) By how many degrees must it rise from the midnight reading to reach the freezing point of water?
- At the start of the month Mr. Verma's bank balance was ₹1,200. He received credits of ₹3,500 and ₹800 and made debits of ₹2,900 (rent) and ₹2,950 (grocery and bills). (a) Find his closing balance. (b) The bank requires a minimum balance of ₹500. How much must he deposit to meet this?
- A research submarine is at -240 m (sea level is 0 m). It rises 85 m to avoid a cable and then dives 130 m . A helicopter hovers exactly above it at $+150\text{ m}$. (a) What is the final position of the submarine? (b) How far apart, vertically, are the helicopter and the submarine?

5. A mine lift starts at ground level (0 m) and goes down to -120 m. It then goes up 45 m to load ore and down 90 m to a deeper tunnel. A second tunnel is at -200 m. (a) At what level is the lift finally? (b) How many more metres must it go down to reach the second tunnel?
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6. During a rocket launch, ISRO engineers measure time in seconds from lift-off ($T = 0$). Times before lift-off are negative and times after are positive. The fuel check is done at $T - 240$, engine ignition at $T - 5$, stage separation at $T + 130$ and satellite release at $T + 1020$. Find the time gap (a) from the fuel check to ignition, (b) from ignition to stage separation, (c) from the fuel check to the satellite release, in seconds and in minutes.
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7. The float marker of an overhead water tank reads 0 when the tank is half full; readings above are positive and readings below are negative (in cm). On Monday morning the reading is -40 . The motor raises the water by 65 cm and by evening the family uses 90 cm of water. (a) What is the evening reading? (b) By how many cm is it lower than the Monday-morning reading? (c) How much water must be added to bring the marker to 0?
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8. A vegetable vendor noted his daily profit (+) or loss (–) for five days: $+\text{₹}350$, $-\text{₹}120$, $-\text{₹}275$, $+\text{₹}410$, $-\text{₹}90$. (a) What is his net result for the five days? (b) How much more must he earn on the sixth day so that his total profit for six days is $\text{₹}500$?
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9. A ship leaves a port that is 24 km west of a lighthouse. Take the lighthouse as 0, east as positive and west as negative. The ship sails 15 km east, then 28 km east, and then 35 km west. (a) Find its final position. (b) How far is the ship from the lighthouse and on which side? (c) What total distance did the ship sail?
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- 10.** The Mauryan empire was established around 322 BCE and the Kalinga war took place around 261 BCE. Brahmagupta wrote his famous book in 628 CE. Remember that there is no year 0 (1 BCE is followed by 1 CE). Find (a) the number of years from 322 BCE to 261 BCE, and (b) the number of years from 261 BCE to 628 CE.
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ANSWER KEY – Word Problems Worksheet Set 1

1. (a) Down: $(-2) - (+16) = -18$, so 18 floors down. Up: $(+24) - (-2) = +26$, so 26 floors up. (b) Total movement = $(-18) + (+26) = +8$. Check: $(+24) - (+16) = +8$.
2. (a) 2 p.m.: $(-7) + (+13) = +6$ °C. Midnight: $(+6) - (+16) = -10$ °C. (b) $(-10) - (-7) = -3$, so midnight was 3 °C colder. (c) $0 - (-10) = +10$, so it must rise by 10 °C.
3. (a) $1200 + 3500 + 800 = 5500$; debits = $2900 + 2950 = 5850$. Balance = $5500 - 5850 = -₹350$ (overdrawn). (b) Needed change = $(+500) - (-350) = +₹850$. (He needs ₹350 just to reach zero and ₹500 more for the minimum balance.)
4. (a) $(-240) + (+85) = -155$; then $(-155) + (-130) = -285$ m. (b) $(+150) - (-285) = 150 + 285 = 435$ m.
5. (a) $(-120) + (+45) = -75$; then $(-75) + (-90) = -165$ m. (b) $(-200) - (-165) = -35$, so it must go 35 m further down.
6. (a) $(-5) - (-240) = +235$ s. (b) $(+130) - (-5) = +135$ s. (c) $(+1020) - (-240) = 1260$ s = 21 minutes. (Check: $235 + 135 + 890 = 1260$.)
7. (a) $(-40) + (+65) = +25$; then $(+25) - (+90) = -65$ cm. (b) $(-40) - (-65) = +25$, so it is 25 cm lower than the morning reading. (c) $0 - (-65) = +65$ cm.
8. (a) $350 - 120 = 230$; $230 - 275 = -45$; $-45 + 410 = 365$; $365 - 90 = +₹275$ (net profit). (b) $(+500) - (+275) = +₹225$ on the sixth day.
9. (a) Start -24; after 15 km east: -9; after 28 km east: +19; after 35 km west: $19 - 35 = -16$. (b) It is 16 km west of the lighthouse. (c) $15 + 28 + 35 = 78$ km.
10. (a) $322 - 261 = 61$ years. (b) From 261 BCE to 1 BCE = 260 years; 1 BCE to 1 CE = 1 year; 1 CE to 628 CE = 627 years. Total = $260 + 1 + 627 = 888$ years.

Word Problems Worksheet – Set 2

Chapter 10: The Other Side of Zero | Real-Life Word Problems (Difficulty level 7/10)

Name:	Class:	Section:
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Instructions: Solve each problem step by step. Write the integer expression you use. Each problem carries 3 marks.

Solve the following word problems (10 × 3 = 30 marks)

1. A metro station has its platform 16 m below the road level (–16 m), its ticket concourse 8 m below the road (–8 m) and a foot-over-bridge 7 m above the road (+7 m). Find (a) the height a passenger climbs from the platform to the concourse, (b) the height from the concourse to the foot-over-bridge, and (c) the total height from the platform to the bridge.

2. A paddy field in Kuttanad, Kerala, lies 2 m below sea level (–2 m). The protective bund around it is 1 m above sea level (+1 m) and a nearby hillock is 42 m above sea level. During heavy rain the flood water rises to +2 m. Find (a) the height of the bund above the field, (b) the height of the hillock above the field, (c) the depth of flood water in the field, and (d) by how much the flood level is above the top of the bund.

3. On a winter night the temperature in Gulmarg was –7 °C, in Shimla +3 °C and in Delhi +11 °C. (a) How much warmer was Delhi than Gulmarg, and Shimla than Gulmarg? (b) Later that night, Gulmarg fell by 5 °C and Shimla fell by 8 °C. Find their new temperatures and the new difference between them.

4. In a school quiz, a team's score in each of five rounds was +30, –15, +20, –25 and +10 (negative marks for wrong answers). Team B's total after five rounds was +35. (a) Find Team A's total score. (b) By how many marks is Team B ahead? (c) In round 6, Team B scores –5. What is the least score Team A must make in round 6 to overtake Team B?

5. Sunita has ₹5,000 in her bank account. She pays a school fee of ₹3,200, pays her bills of ₹2,850, receives ₹1,500 as a refund and then pays ₹900 for books, in that order. (a) Write her balance after each of the four transactions. (b) What was her lowest balance? (c) How much must she deposit to have ₹1,000 in the account at the end?
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6. Arjun's online chess rating was 1,000. After six games his rating changed by +12, -8, -15, +20, -9 and +5 points. (a) Find his rating after each game. (b) What is the net change in his rating? (c) What was his lowest rating and how many points below his starting rating was it?
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7. A patient weighed 68 kg. Over four weeks his weight changed by -3 kg, -2 kg, +1 kg and -4 kg in the four weeks respectively. (a) Find his weight at the end of each week. (b) Find the net change in weight. (c) His doctor advises a healthy weight of 62 kg. By how much should his weight change from the final reading to reach it?
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8. In a hospital the lab is on Floor -2 (basement) and the wards are on Floors +1 to +6. A nurse starts at the lab, goes up to the ward on Floor +4, goes down to the pharmacy on Floor -1, and then goes up 3 floors to the reception. (a) On which floor is the reception? (b) What is the total number of floors the lift travelled? (c) What is her net movement from the lab to the reception?
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9. A stationery shop wants to keep 500 notebooks in stock. Each morning the owner records how the stock compares with 500 (below 500 is negative). On Monday it was -45. From Monday, the readings changed by +120 on Tuesday, -180 on Wednesday, +60 on Thursday and -25 on Friday. (a) Find the comparison reading for each day from Tuesday to Friday. (b) On which day was the stock furthest below 500? (c) How many notebooks must he order on Friday to reach 500?

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10. Kautilya's Arthashastra was written around 300 BCE, the Bakhshali manuscript is dated around 300 CE and Brahmagupta wrote in 628 CE. There is no year 0. Find (a) the number of years from 300 BCE to 300 CE, (b) the number of years from 300 CE to 628 CE, and (c) the number of years from 300 BCE to 628 CE.
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ANSWER KEY – Word Problems Worksheet Set 2

1. (a) $(-8) - (-16) = +8$ m. (b) $(+7) - (-8) = +15$ m. (c) $8 + 15 = 23$ m. Check: $(+7) - (-16) = +23$ m.
2. (a) $(+1) - (-2) = 3$ m. (b) $(+42) - (-2) = 44$ m. (c) $(+2) - (-2) = 4$ m deep. (d) $(+2) - (+1) = 1$ m above the bund, so the water overflows.
3. (a) Delhi – Gulmarg = $(+11) - (-7) = 18$ °C. Shimla – Gulmarg = $(+3) - (-7) = 10$ °C. (b) Gulmarg: $(-7) + (-5) = -12$ °C. Shimla: $(+3) + (-8) = -5$ °C. New difference = $(-5) - (-12) = 7$ °C.
4. (a) $30 - 15 = 15$; $15 + 20 = 35$; $35 - 25 = 10$; $10 + 10 = +20$. (b) $(+35) - (+20) = 15$ marks. (c) Team B becomes $35 + (-5) = +30$. Team A needs $20 + x > 30$, so $x > 10$. The least score is +11.
5. (a) $5000 - 3200 = ₹1,800$; $1800 - 2850 = -₹1,050$; $-1050 + 1500 = ₹450$; $450 - 900 = -₹450$. (b) Lowest balance = $-₹1,050$. (c) $(+1000) - (-450) = ₹1,450$.
6. (a) 1012, 1004, 989, 1009, 1000, 1005. (b) $12 - 8 - 15 + 20 - 9 + 5 = +5$ points. (c) Lowest = 989 (after game 3), which is $1000 - 989 = 11$ points below the start.
7. (a) 65 kg, 63 kg, 64 kg, 60 kg. (b) $(-3) + (-2) + (+1) + (-4) = -8$ kg. (c) $(+62) - (+60) = +2$ kg (he should gain 2 kg).
8. (a) $(-1) + (+3) = \text{Floor } +2$. (b) Lab to ward: $(+4) - (-2) = 6$ floors; ward to pharmacy: $(-1) - (+4) = 5$ floors down; pharmacy to reception: 3 floors. Total = $6 + 5 + 3 = 14$ floors. (c) $(+2) - (-2) = +4$ floors (net movement).
9. (a) Tuesday: $(-45) + 120 = +75$. Wednesday: $75 - 180 = -105$. Thursday: $-105 + 60 = -45$. Friday: $-45 - 25 = -70$. (b) Wednesday (-105, i.e., only 395 notebooks). (c) $0 - (-70) = 70$ notebooks.
10. (a) 300 BCE to 1 BCE = 299 years; 1 BCE to 1 CE = 1 year; 1 CE to 300 CE = 299 years. Total = 599 years. (b) $628 - 300 = 328$ years. (c) $599 + 328 = 927$ years.

Word Problems Worksheet – Set 3

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Date: _____	Roll No.: _____	Marks (out of 30): _____

Instructions: Solve each problem step by step. Write the integer expression you use. Each problem carries 3 marks.

Solve the following word problems (10 × 3 = 30 marks)

1. A multi-storey car park in Chennai has levels from +3 down to -4 (ground level is 0). A car enters at Level 0 and drives down 3 levels looking for a space. All are full, so it drives up 5 levels and finds a space on the upper level. The driver then realises that his ticket is for Level -1 and drives to it. (a) At which level did he find the space first? (b) What is the movement needed from that level to Level -1? (c) How many levels did the car travel in all?

2. A kabaddi team's winning margin (points scored minus points conceded) in five matches was +7, -4, -11, +9 and -3. (a) Find the sum of the margins. (b) In which match did the team suffer the heaviest defeat and by how many points? (c) What margin must the team achieve in the sixth match to make the total margin +10?

3. The weekly account of a school canteen showed: Monday +₹640, Tuesday -₹210, Wednesday -₹380, Thursday +₹95 and Friday +₹450 (profit is positive, loss is negative). (a) Find the net profit or loss of the week. (b) On which day was the loss greatest? (c) After which day was the running total the lowest, and what was it? (d) How much more must it earn on Saturday to make the weekly total ₹1,000?

4. In a Delhi neighbourhood, the water level in a well is measured from the ground level (0). It was -18 m. After the monsoon it rose by 6 m, and after a dry summer it fell by 11 m from the monsoon level. A nearby borewell has its water level at -25 m. (a) Find the well's level after the monsoon. (b) Find the well's level after summer. (c) Compare it with the borewell: which has the higher water level and by how much? (d) By how much must the well's level rise to reach -10 m?

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5. In the integer Snakes and Ladders game, Meera is at +12. She rolls +6 and -4. She may add them or subtract in either order. (a) List the three possible moves. (b) Write her new position for each move. (c) To win she must reach +50. How far is she from +50 if she makes the best move?
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6. A vaccine truck must keep its temperature between +2 °C and +8 °C. It starts at +4 °C. When the door is opened the temperature falls by 7 °C. The driver then switches on the cooler heater and it rises by 9 °C. Later, a hot afternoon adds another 4 °C. (a) Find the temperature after each event. (b) By how many degrees was it below the safe minimum at its lowest? (c) By how many degrees is the final temperature above the safe maximum?
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7. A cricket team needs an average of 8 runs per over. For each over, the scorer writes (runs scored – 8). In the first five overs the team scored 6, 4, 11, 13 and 7 runs. (a) Write the five differences as integers. (b) Find their sum. (c) Is the team ahead of or behind the required rate after five overs and by how many runs? Verify by using the total runs scored.
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8. A hill road starts from the town bus stand, which is taken as 0 m. The river bridge is at -45 m, the temple is at +215 m and a lake beyond the temple is at -30 m. A bus goes from the bridge to the temple and then to the lake. (a) By how many metres does the bus climb from the bridge to the temple? (b) By how many metres does it descend from the temple to the lake? (c) What total vertical distance does it cover? (d) Is the lake higher or lower than the bridge, and by how much?
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9. A stock market index opened the week at 24,500 points. Its daily changes from Monday to Friday were +210, -340, -125, +480 and -95 points. (a) Find the index at the close of each day. (b) On which day was it lowest and by how many points was it below the opening level? (c) What was the net change for the whole week?
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10. Emperor Ashoka's rock edicts date from about 250 BCE, the Vikram Samvat calendar begins in 57 BCE and the Gupta era begins in 319 CE. There is no year 0. Find (a) the number of years from 250 BCE to 57 BCE, (b) the number of years from 57 BCE to 319 CE, and (c) the number of years from 250 BCE to 319 CE.
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ANSWER KEY – Word Problems Worksheet Set 3

1. (a) $0 \rightarrow -3 \rightarrow (-3) + 5 = \text{Level } +2$. (b) $(-1) - (+2) = -3$, i.e., 3 levels down. (c) $3 + 5 + 3 = 11$ levels.
2. (a) $7 - 4 = 3$; $3 - 11 = -8$; $-8 + 9 = 1$; $1 - 3 = -2$. (b) Match 3, by 11 points. (c) $(+10) - (-2) = +12$ points.
3. (a) $640 - 210 = 430$; $430 - 380 = 50$; $50 + 95 = 145$; $145 + 450 = +\text{₹}595$ (profit). (b) Wednesday (loss of ₹380). (c) After Wednesday, the running total was ₹50 (others: 640, 430, 145, 595). (d) $(+1000) - (+595) = \text{₹}405$.
4. (a) $(-18) + (+6) = -12$ m. (b) $(-12) + (-11) = -23$ m. (c) $-23 > -25$, so the well is higher by $(-23) - (-25) = 2$ m. (d) $(-10) - (-23) = +13$ m.
5. (a) $(+6) + (-4) = +2$; $(+6) - (-4) = +10$; $(-4) - (+6) = -10$. (b) $12 + 2 = +14$; $12 + 10 = +22$; $12 + (-10) = +2$. (c) The best move is +10, taking her to +22. Distance to win = $50 - 22 = 28$.
6. (a) $(+4) + (-7) = -3$ °C; $(-3) + (+9) = +6$ °C; $(+6) + (+4) = +10$ °C. (b) $(+2) - (-3) = 5$ °C below the safe minimum. (c) $(+10) - (+8) = 2$ °C above the safe maximum.
7. (a) $6 - 8 = -2$; $4 - 8 = -4$; $11 - 8 = +3$; $13 - 8 = +5$; $7 - 8 = -1$. (b) $(-2) + (-4) + 3 + 5 + (-1) = +1$. (c) Ahead by 1 run. Check: total runs = $6 + 4 + 11 + 13 + 7 = 41$, and $5 \times 8 = 40$, so $41 - 40 = +1$.
8. (a) $(+215) - (-45) = 260$ m. (b) $(-30) - (+215) = -245$, i.e., 245 m downhill. (c) $260 + 245 = 505$ m. (d) $(-30) - (-45) = +15$, so the lake is 15 m higher than the bridge.
9. (a) Monday 24,710; Tuesday 24,370; Wednesday 24,245; Thursday 24,725; Friday 24,630. (b) Wednesday, 24,245 – that is 255 points below 24,500 (net of $+210 - 340 - 125 = -255$). (c) $210 - 340 - 125 + 480 - 95 = +130$ points.
10. (a) $250 - 57 = 193$ years. (b) 57 BCE to 1 BCE = 56 years; 1 BCE to 1 CE = 1 year; 1 CE to 319 CE = 318 years. Total = 375 years. (c) $193 + 375 = 568$ years.