Honors Precalculus Word Problems

These are some of the most common types of word problems asked in this course. Try the following problems below!

Mixture Word Problems

Level 1: Easy

1. How many liters of a 40% sugar solution must be mixed with 5 L of pure water to make a 20% sugar solution?

2. You have 12 L of 10% acid solution. How much 50% acid solution should be added to make a 25% acid solution?

3. How many gallons of a 25% antifreeze solution must be mixed with pure antifreeze (100%) to make 10 gallons of a 40% solution?

Level 2: Medium

4. A chemist mixes a 15% alcohol solution with a 45% alcohol solution to make 30 L of a 25% solution. How much of each should she use?

5. You have 8 L of a 60% solution. How much water must be added to make it a 40% solution?

6. A goldsmith wants to melt and mix gold that is 80% pure with gold that is 50% pure to make 60 g of 70% pure gold. How much of each should be used?

7. A 5% sugar solution is mixed with a 25% sugar solution to obtain 30 L of a 15% sugar solution. How many liters of each solution should be mixed?

Level 3: Hard

8. A tank contains 10 L of a 40% saline solution. How many liters must be drained and replaced with water to reduce the concentration to 25%?

9. A jeweler has a 10% silver alloy and a 60% silver alloy. How many grams of each are needed to make 200 g of a 45% alloy?

10. You have 30 L of a 10% solution and 20 L of a 60% solution. You want to make a 40% solution. How many liters of each should you mix, and how much of the mixture must be discarded to end with 40 L total?

Level 4: Value Mixture

11. A coffee shop blends beans that cost $8/lb with beans that cost $12/lb to make 50 lb of a blend worth $10/lb. How many pounds of each type should they use?

12. A candy maker mixes chocolate worth $4/kg with another worth $6/kg to get 30 kg of a blend worth $5.40/kg. How much of each should be used?

13. A jeweler has 24 g of 90% gold alloy and adds x g of 60% gold alloy to make a mixture that is 75% pure gold. Find x.

Level 5: Multi-Step / Two-Stage Mixtures

14. You have 20 L of a 30% acid solution. You add x L of a 70% solution. Then, 10 L of the mixture is poured out and replaced with water. The final concentration is 36%. Find x.

15. 15 L of 10% solution and 5 L of 50% solution are mixed. How much of this mixture must be replaced with water to make the final solution 20%?

16. A tank has 100 L of a 40% solution. Water is added at 5 L/min while the mixture is drained at the same rate. Find the concentration after 10 minutes.

Level 6: System of Mixtures (Multiple Solutions)

17. A chemist needs 10 L of a 20% solution and 20 L of a 50% solution, using only 10% and 60% solutions. How many liters of each should she use for both mixtures?

18. A factory produces two cleaning products: one 30% acid, one 50% acid. Using only 10% and 70% solutions, how much of each should be mixed to make 40 L of each product?

19. A pharmacist has a 10% saline solution and a 30% saline solution. He must prepare 500 mL of 15% solution and 300 mL of 25% solution at the same time. Set up a system for the amounts needed.

Level 7: Honors Challenge (Modeling/Nonlinear Thinking)

20. A 200 L tank contains a 25% salt solution. Pure water flows in at 4 L/min, and the mixture drains at the same rate. Write a formula for the concentration after t minutes.

21. A tank starts with 100 L of 30% solution. Pure water flows in at 3 L/min, and the well-mixed solution drains out at 3 L/min. After 15 minutes, 10 L of 60% solution is suddenly added. What is the new concentration?

22. A mixture is initially 40% acid. After adding 5 L of 70% acid, the concentration rises to 50%. How much of the original mixture was there initially?

Work Word Problems

Level 1: Easy

1. Alice can paint a room in 4 hours. Bob can paint the same room in 6 hours. How long will it take them if they work together?

2. A machine can fill a tank in 5 hours. A second machine can fill it in 10 hours. How long if both run together?

Level 2: Medium

3. A and B can complete a job in 8 hours and 12 hours, respectively. They work together for 3 hours. How much of the job is left?

4. John can mow a lawn in 3 hours. His friend can mow the same lawn in 2 hours. If they work together, how long will it take to mow half the lawn?

5. Two pumps, P1 and P2, can empty a pool in 6 hours and 9 hours individually. If P1 runs alone for 2 hours and then P2 joins, how long until the pool is empty?

Level 3: Hard

6. A crew of 3 workers: A can do the job in 6 hours, B in 8 hours, and C in 12 hours. How long will it take if all three work together?

7. A painter can do a job in 10 hours. After working 4 hours alone, a second painter joins, who can finish it in 15 hours alone. How long will it take to finish together?

8. Two people, A and B, can build a wall together in 5 hours. A can do it alone in 7 hours. How long would B take alone?

9. A tank can be filled by two pipes: Pipe X fills it in 6 hours, Pipe Y in 9 hours. Pipe Y runs alone for 2 hours, then both pipes open. How long until the tank is full?

10. Worker A can do a job in 5 hours, Worker B in 7 hours, Worker C in 10 hours. Worker A starts alone for 1 hour, then B joins. After 2 more hours, C joins. How much longer to finish the job?

Motion and Distance Word Problems

Level 1: Easy

1. A car travels at 60 km/h. How far will it go in 3 hours?

2. A cyclist travels 15 km in 1.5 hours. What is the cyclist's speed?

3. A train travels 120 km at a speed of 40 km/h. How long does the journey take?

Level 2: Medium

1. A car and a bus start from the same point. The car travels at 50 km/h and the bus at 40 km/h. How long until the car is 30 km ahead of the bus?

2. Two people walk toward each other from towns 30 km apart. One walks at 4 km/h and the other at 6 km/h. How long until they meet?

3. A runner completes a 10 km race at 8 km/h. A second runner starts 15 minutes later at 10 km/h. How long will it take the second runner to catch up?

Hard

1. A boat can travel 12 km/h in still water. If the river current is 3 km/h, how long will it take to travel 30 km downstream and back upstream?

2. Two trains leave stations 500 km apart at the same time, heading toward each other. One travels at 80 km/h and the other at 70 km/h. Where and when will they meet?

3. A cyclist travels from A to B in 2 hours. Returning from B to A along the same path, he travels at 5 km/h slower and takes 3 hours. Find the distance between A and B.

4. Two cars start from the same point. Car X travels at 60 km/h and car Y at 80 km/h. After how long will car Y be twice as far from the starting point as car X?