Year 12 Science: Forces, torque and circular motion

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. What net force gives a 1500 kg car an acceleration of 2.4 m s^{-2}?

2. A box is pushed with 30.0 N east and 40.0 N north at the same time. What is the resultant force?

3. A 40.0 N force pushes at right angles on the end of a spanner 0.250 m long. What torque does it make?

4. A 30.0 kg child sits 1.50 m from the pivot of a seesaw. How far from the pivot, on the other side, must a 45.0 kg child sit to balance it?

5. A 0.200 kg puck on a string moves in a horizontal circle of radius 0.800 m at 3.00 m s^{-1} on a frictionless table. What is the tension in the string?

Exam-style question: the diving board

At the pools, a uniform diving board is 3.00 m long and weighs 300 N. Its left end, A, is bolted to the ground, and it rests on a support B, 1.00 m from A. A diver weighing 600 N stands at the far right end. Use g = 9.8 m s^{-2}.

6. State the two conditions for the board to be in equilibrium.

7. By taking torques about B, calculate the size and direction of the force the bolt at A exerts on the board.

8. Calculate the force from support B.

9. The diver walks slowly from above B to the far end. Discuss how the forces at A and B change, and why.

Fix the mistake

10. Correct this statement: "Drawing friction, then a separate centripetal force arrow, on a car going round a corner."

11. Correct this statement: "Torque of the plank's weight = 200 N × 4.00 m, using the plank's length."

12. Correct this statement: "The table pushes up on the book and the book pushes down on the table, so those balance and the book stays still."

13. Correct this statement: "In a circle, the object flies outwards when the string breaks."