Name _____
Period_____ Teacher_____

# USS Midway Active Physics Worksheet

As you go through the Museum fill in the missing pieces of information. Some of the information is on the audiotape (a) and some is from the display plaques (p) placed throughout the ship. The museum is constantly adding new displays and some of the audio station numbers ( S # )may not match up with the questions. You will need a **Calculator** to do some of the math. Start the tour on the ships bridge, because it will get busy later in the day.

S 21 Catapult. The catapults could accelerate an aircraft like the A-7 Corsair II from 0 to 120 knots in 1.2 Seconds

A knot is a nautical mile or 2000 yards, a regular mile is 1760 yards. If One knot = 1.136 Miles per hour, how fast is 120 knots?

$$\frac{120\ K}{1} \times \frac{1.136\ MPH}{1\ K} = \frac{_____\ Miles}{Hour}$$

If one meter is 39.25inches how many meters per second is that?

$$\frac{_____\ Miles}{Hour} \times \frac{1\ hour}{?\ minutes} \times \frac{1minute}{?\ seconds} \times \frac{1760\ yards}{1\ Mile} \times \frac{36\ inches}{1\ yard} \times \frac{1\ Meter}{39.25\ inches} = \frac{____\ Meters}{1\ sec}$$

What is the average acceleration during the catapult launch?

$$a = \frac{change\ in\ velocity\ _____}{change\ in\ time} \qquad \frac{_____\ end\ velocity\ -\ zero}{time\ it\ takes\ to\ accelerate\ in\ seconds}$$

If the A-7 aircraft weighs (p) _____ and 2.2 lbs equals one Kg, How much average force is applied during the launch? F = m x a

$$(p)\ \frac{_____\ lbs}{} \times \frac{1\ kg}{2.2\ lbs} = \frac{_____\ kg}{mass\ of\ one\ A\text{-}7\ airplane}$$

$$\frac{_____\ kg}{mass\ of\ A\text{-}7} \times \frac{____\ a}{acceleration\ (from\ the\ other\ side\ of\ this\ worksheet)} = \frac{_____\ Force}{to\ launch\ an\ A\text{-}7}$$

What do the initials JBD stand for? (a)_____

Look back at the island, or the steering wheel of the ship. An important safety reminder is written in big bold yellow letters. Finish the sentence. Beware of jet _____ _____ _____ _____.

S 27 The S-2 Sea Sprite helicopter was often used to find submarines under water. Subs are made of steel and steel is magnetic so this helicopter used a very sensitive detector inside the yellow and red tube to measure changes in the magnetic field of the earth. A big change in the field often told the pilot that a sub was under him. The tube was lowered on a cable to get away from the helicopter's own magnetic field. What was the tub under the chin of the helicopter for? (a)_____

_____

If you look straight out towards the horizon, every 5 miles away, the surface of the earth drops about 16 feet. From a tall ship like the Midway you can see out over the ocean quite a distance. How far

depends on how high the object you are looking at is. Why would putting a radar high up in a flying helicopter or airplane be helpful? _____

_____

_____

Be careful, sending out radar waves could also make it easy for the enemy to find you.

S29 Why was the twin rotor design of the CH-46 Sea Knight so good for delivering cargo? (a)____

_____

If the seats inside the helicopter were folded up, cargo could be stored inside. What is on the floor of the helicopter to help with the loading and unloading the cargo? _____

_____

What is VERTREP? How did this technique save the Navy a lot of time? (a) _____

_____

S 35 S-3 Viking patrol plane. Stand behind the engine of this airplane, This is a TF-34 high bypass turbo fan, a lot of the air that comes in the front of the engine passes right through the circular vents in the side and is never heated up by the burning fuel. These engines are relatively quiet because the "cold" air coming out of the engine surrounds the hot noisy air coming out of the center of the engine. How do you think this engine compares with the J79 engine?(station 8) Which engine is built for speed?

_____

Which engine is more fuel efficient? _____

The S-3 was used for long range submarine patrols. What type of weapon is inside the body of the airplane and is used for attacking submarines? _____. How would this weapon move to find a target submarine? _____

S 7 Liquid OXygen Generator. What was LOX used for on the ship, why would an aircraft carrier have this dangerous stuff on board?(a)_____

_____

S 8 Aircraft engines (p) The T-58 turbo shaft engine developed in the 1960's for helicopters and has a weight of _____ pounds and a shaft horsepower of _____. It is a jet engine with a gear box attached to the axle to slow down the Revolutions Per Minute enough so that helicopter blades could be attached. What is the Horsepower to weight ratio?

(horsepower ÷ weight) _____ $\frac{\text{horsepower}}{\text{weight}}$ = _____horsepower = weight corvette

The 1987 Corvette has an engine that is 540 pounds and has a horsepower of 240
Which engine has a higher horsepower to weight ratio? _____

J79 Jet engine. Notice the air is sucked in one end of the J79 and goes out the other end. Look into the exhaust end of the engine. This end is a nozzle and is adjustable in diameter. Cool air is blown in around the outside as a liner to help keep the metal of the nozzle from melting. When you put a spray nozzle on a hose what happens to the velocity of the water as it leaves the hose through the small opening? _____

_____

What would happen to the velocity of the air coming out of the nozzle of the jet engine if the after end after end was squeezed down? _____

To produce even more force from this engine, more fuel was pumped into this back part of the engine which would immediately ignite and expand rapidly. The afterburner used up a lot of fuel but produced an incredible amount of force. Force with after burn(p)____ without after burn _____