Basic Fluid Power

Hydraulic Leverage

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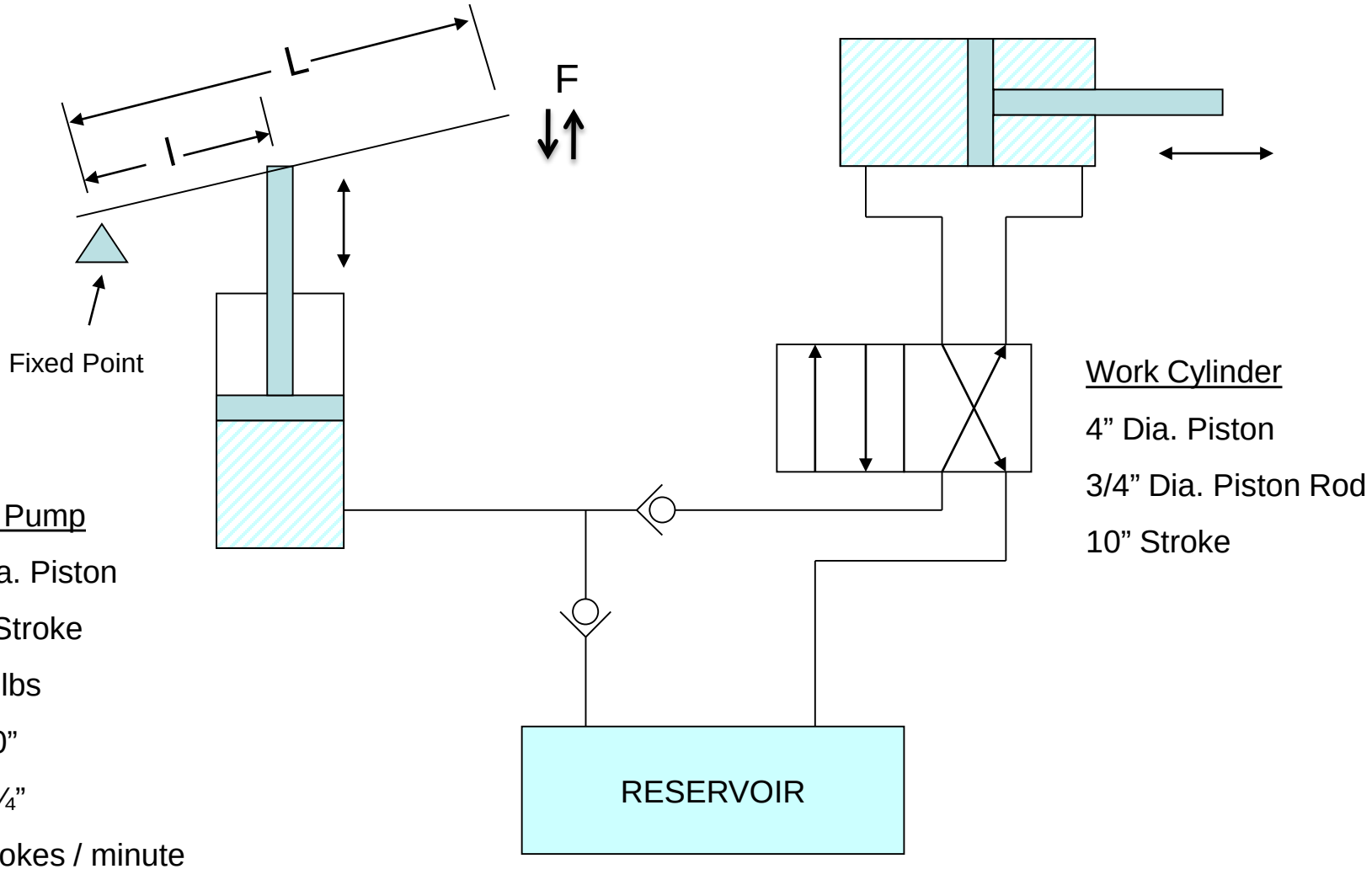

Work Cylinder

4” Dia. Piston

3/4” Dia. Piston Rod

10” Stroke

Hand Pump

¾” Dia. Piston

1 ¼” Stroke

F= 25lbs

L = 10”

l = 1 ¼”

30 strokes / minute

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Sample Questions

1. What is the force applied to the work cylinder when extended?
   a) Calculate the force at the hand pump:

   b) Calculate the area of hand pump cylinder:

   c) Calculate the pressure in the system:

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Sample Questions

1. What is the force applied to the work cylinder when extended?

   d) Calculate the surface area of the work cylinder when extending then solve for Force:

Calculate the surface area of work cylinder when extending.

Solve for force when extending.

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Sample Questions

2. What is the force applied to the work cylinder when retracted?

   a) Calculate the surface area of the work cylinder when retracting (total area minus piston rod area:

Calculate the area of work cylinder piston rod.

Calculate effective area.

   b) Calculate force.

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Sample Questions

2. What is the force applied to the work cylinder when retracted?

   c) Verify Results

Work In = Work Out

Work In

Work Out

Calculated for work cylinder extending.

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Sample Questions

3. What is the time to fully extend the work cylinder?

   a) Calculate Distance / Stroke

      Volume = Area * Height

      Calculate the volume in the pump cylinder per stroke.

      Calculate the distance the work cylinder moves per stroke.

   b) Calculate how many strokes are required to extend work cylinder.

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Sample Questions

3. What is the time to fully extend the work cylinder?
   c) Calculate how much time is required to fully extend work cylinder.

4. What is the time to fully retract the work cylinder?
   a) Calculate Distance / Stroke.

Calculate the distance the work cylinder moves per stroke.

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Sample Questions

4. What is the time to fully retract the work cylinder?

   b) Calculate how many strokes are required to retract the cylinder.

   c) Calculate how much time is required to fully retract the work cylinder.

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Sample Questions

5. What is the HP assuming 100% efficiency?

1HP = 33,000lbs elevated 1ft in 1minute

a) Calculate the extend time in ft / minute

b) Calculate HP