Calculus 2 Workbook

Work

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WORK DONE TO LIFE A WEIGHT OR MASS

1. Find the work required to lift a 50-pound load from ground level up into a tree house that's 60 feet above the ground, if the chain being used to lift the weight itself weighs 1 pound per foot.

2. Find the work required to lift a 40-pound box of roofing nails from ground level up onto a roof that's 35 feet above the ground, if the rope being used to lift the weight itself weighs 2 ounces per foot.

3. Find the work required to lift a $5{,}500$-pound load of concrete from ground level up onto a construction platform that's 75 feet above the ground, if the cable being used to lift the weight itself weighs 8 pounds per foot.

4. Find the work required to lift a 5-gallon bucket of water, with each gallon of water weighing 6.75 pounds and the bucket weighing 2 pounds, from ground level up onto a scaffold that's 14 feet above the ground, if the rope being used to lift the weight itself weighs 8 ounces per foot.

5. Find the work required to lift a $7{,}200$-pound load of rocks from ground level up into a dump truck that's 13 feet above the ground, if the chain being used to lift the weight itself weighs 12 pounds per foot.

WORK DONE ON ELASTIC SPRINGS

■ 1. Find the work required to stretch a spring 3 feet beyond its normal length, if a force of $5s$ lbs is required to stretch the spring s feet beyond its normal length.

■ 2. Find the work required to stretch a spring 7 inches beyond its normal length, if a force of $9s$ lbs is required to stretch the spring s inches beyond its normal length.

■ 3. Find the work required to stretch a spring 6 feet beyond its normal length, if a force of $15s$ lbs is required to stretch the spring s feet beyond its normal length.

■ 4. Find the work required to stretch a spring 1 foot beyond its normal length, if a force of $3.5s$ lbs is required to stretch the spring s feet beyond its normal length.

■ 5. Find the work required, in foot pounds, to stretch a spring 58 inches beyond its normal length, if a force of $4s$ lbs is required to stretch the spring s feet beyond its normal length.

WORK DONE TO EMPTY A TANK

■ 1. Find the work required to empty a tank that is 6 feet wide, 8 feet tall, 12 feet long, and completely full. The tank will be emptied by pumping the liquid in the tank through a hose to a height of 2 feet above the top of the tank. The liquid in the tank has a density of 58.9 lbs/ft^3.

■ 2. Find the work required to empty an in-ground swimming pool that is 20 feet wide, 4 feet deep, 18 feet long, and completely full. The pool will be emptied by pumping the water in the pool through a hose over the top of the pool. The water in the pool has a density of 62.43 lbs/ft^3.

■ 3. Find the work required to empty a cylindrical tank that is 12 feet tall, has a radius of 6 feet, and is half full of diesel fuel. The tank will be emptied by pumping the fuel in the tank through a hose to a height of 6 feet above the top of the tank. The diesel fuel in the tank has a density of 53.5 lbs/ft^3.

■ 4. Find the work required to empty an above-ground child's pool that is 2 feet tall, has a diameter of 8 feet, and is three-fourths full. The pool will be emptied by pumping the water in the pool through a hose over the top of the pool. The water in the pool has a density of 62.4 lbs/ft^3.

5. Find the work required to empty a cylindrical tank that is 8 feet tall, has a radius of 9 feet, and is three-fourths full of gasoline. The tank will be emptied by pumping the gas in the tank through a hose into a truck that's 8 feet above the top of the tank. The gasoline in the tank has a density of 54.5 lbs/ft^3.

WORK DONE BY A VARIABLE FORCE

1. Calculate the variable force on the interval $[0,2]$.

$$F(x) = 3x^2 + 2x$$

2. Calculate the variable force on the interval $[0,\pi/2]$.

$$F(x) = 3\sin(2x) + x$$

3. Calculate the variable force on the interval $[1,6]$.

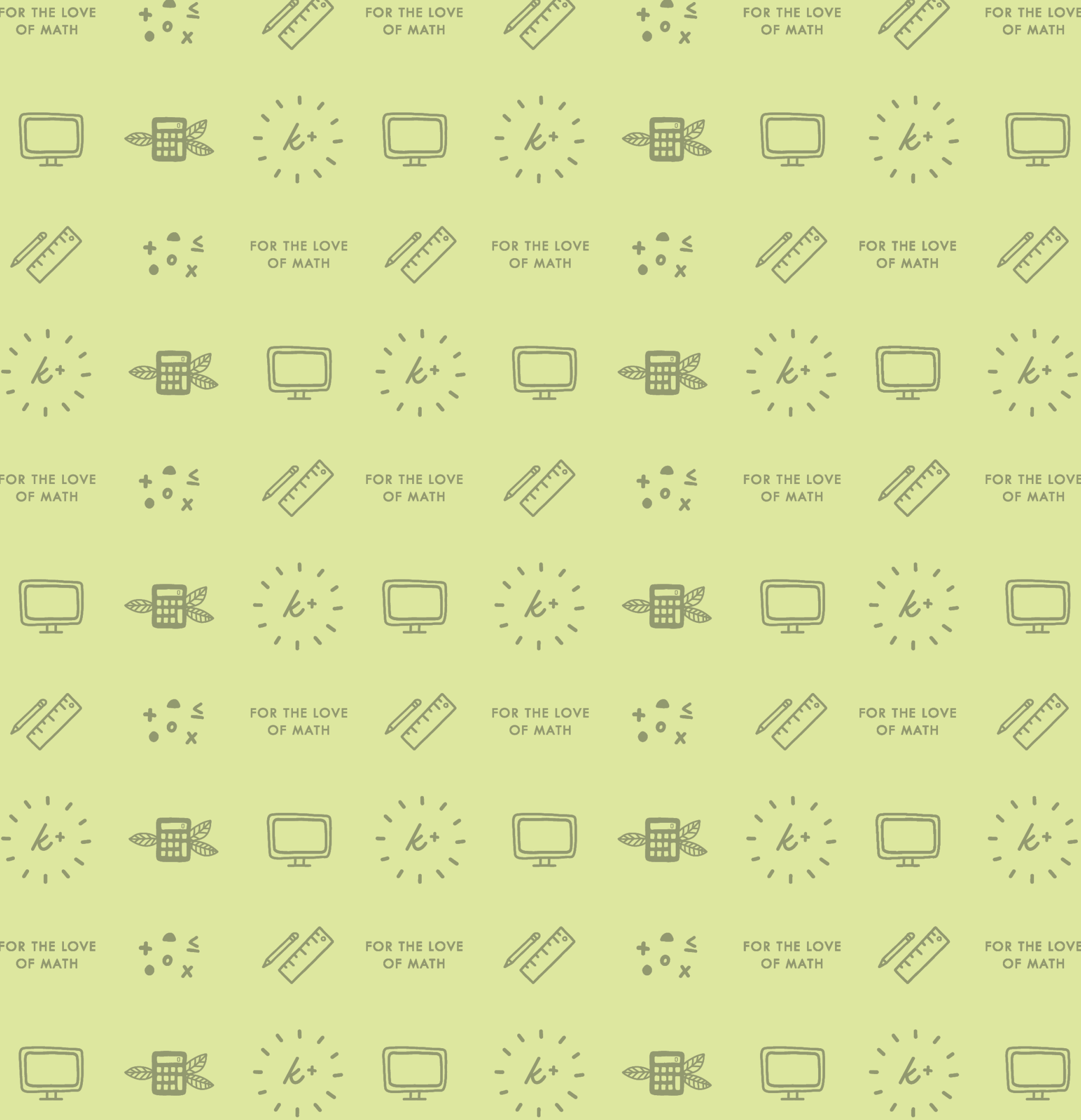
$$F(x) = x^2 + x + 1$$

4. Calculate the variable force on the interval $[0,\pi/3]$.

$$F(x) = 2\tan^2 x$$

5. Calculate the variable force on the interval $[1.2,3.5]$.

$$F(x) = 4(x-2)^3 - 2(x-2) + 1$$


FOR THE LOVE OF MATH