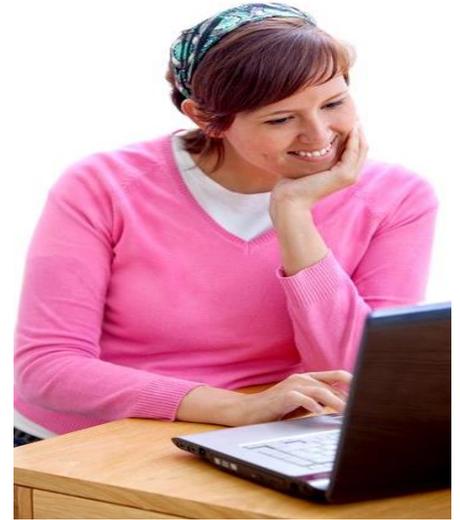


Heather Case Study Answers

Heather is a 33-year-old part-time sociology major who does research at her desk job most of the day. You notice that her shoulders are rounded (kyphosis). In addition, Heather reports that sometimes she has muscle spasms in her upper back when she sits too long at her desk. She is 5'6" tall and weighs 165 lbs, with a waist circumference of 35 inches. Results from her last physical revealed the following values: resting blood pressure 130/85 mmHg, total cholesterol 175 mg/dL, LDL 121 mg/dL, HDL 39 mg/dL, fasting blood glucose 95 mg/dL, and triglycerides 75 mg/dL. Her resting heart rate is 80 beats/min and regular. She is a social smoker and has 1-2 cigarettes a day. Her mother passed away at the age of 64 due to a myocardial infarction. She plays basketball for 30 minutes once a week. She eats out most days she is at work and her doctor expressed concern about her weight and health. She consumes 3 alcoholic drinks per week. She has received some nutritional counseling and plans to adopt a healthier diet. Heather has signed up with a trainer to get in 30 minutes of resistance training 2 days per week. She has a total of 6 hours per week to exercise.



Coronary Risk Factors

1. What is Heather's body mass index (BMI) and body weight category?

$(165 \times 703) / 66 / 66 = 26.6 \text{ kg/m}^2$ Overweight category

2. List Heather's major coronary risk factors (if any):

Abnormal cholesterol, Sedentary lifestyle, Smoker, Family history

3. What other factors that contribute to coronary artery disease risk (if any) does Heather currently have?

None

Physical Fitness Assessments



After ensuring that Heather was fully cleared for exercise, assessments were performed and her results are listed in the chart below.

- Body composition measurements: Triceps 23 mm, Suprailiac 20 mm, Thigh 21 mm
- 1 Mile Walk measurements include: Heart rate = 143 beats/minute and Time = 16:34 minutes.

4. Using the Body Composition and Waist Circumference section of your PHF textbook, determine Heather's percent body fat. Determine her estimated VO_{2max} for the 1 mile walk test by using the formula in the Physical Fitness Assessment section of your textbook. Using the table below, as well as the Normative Data and Fitness Categories section of your textbook, indicate her current fitness category for each test, and create a short-term goal for each test by using the percentage increases listed in the Goal Setting section of your textbook. Heather is a novice exerciser (improvements are greater in unfit individuals and become more difficult as fitness level increases), very motivated and can dedicate 6 hours per week to her exercise program. Note that Heather was unable to do a full body push up, so she performed the modified push up test.

	Current Raw Score	Current Fitness Category	Goal Raw Score*	Goal Fitness Category**
Percent Body Fat	25.5%	High Poor	23.5%	Mid Fair
Sit & Reach (inches)	19.5"	High Fair	20.5"	Mid Good
1 Minute Sit Up	25	Low Fair	28	High Fair
1 Minute Push Up (modified)	20	Mid Fair	25	Low Good
1 Mile Walk (ml/kg/min)	30.9	Low Poor	34.0	High Poor

*Calculations for improving Goal Raw Score were determined using percentages as indicated below:

Body Fat: $25.5 - 2\% = 23.5\%$ Sit & Reach: $19.5 \times 1.05 = 20.5$ inches

Sit Up: $25 \times 1.1 = 28$ Modified Push Up: $20 \times 1.25 = 25$ VO_2 max: $30.9 \times 1.1 = 34.0$ ml/kg/min

**Goal fitness category was determined by looking up the goal raw score in the Cooper Normative Data section of the Principles of Health and Fitness textbook.

Cardiovascular Training and Prescription



5. Based on the above information, using the Heart Rate Reserve formula in the Cardiovascular Training and Prescription section of your textbook, calculate Heather's target HR. Remember that the intensity should be based on her current cardiovascular fitness level from the 1 Mile Walk test

- a. Estimate Max Heart Rate: $207 - (.7 \times 33) = 183.9$ (round up to 184)
- b. Calculate Heart Rate Reserve (HRR): $184 - 80 = 104$
- c. Multiply HRR by Lower Range of Intensity: $104 \times 40\% = 41.6$ (round to 42)
Multiply HRR by Upper Range of Intensity: $104 \times 59\% = 61.3$ (round to 61)
- d. Add back in resting heart rate.
Determine Low End of Target HR: $42 + 80 = 122$ beats per minute
Determine High End of Target HR: $61 + 80 = 141$ beats per minute
- e. Target HR Range = $122 - 141$ beats per minute
- f. Target HR Range (10 second count): $122/6 = 20.3$ (round to 20) and $141/6 = 23.5$ (round to 24)
20-24 beats/10 second count

6. Design a progressive 8 week cardiovascular program for Heather based on her current level of cardiorespiratory fitness to help improve her $VO_{2\max}$ score on her next fitness assessment.

	Mode	Frequency	Intensity	Duration	Weekly Volume
Week 1	Walk	3	122-141 bpm	20 min	60 min
Week 2	Walk	3	122-141 bpm	25 min	75 min
Week 3	Walk	3	122-141 bpm	30 min	90 min
Week 4	Walk &/or Elliptical	4	122-141 bpm	25 min	104 min+
Week 5	Walk &/or Elliptical	4	122-141 bpm	30 min	120 min
Week 6	Walk &/or Elliptical	5	122-141 bpm	30 min	150 min*
Week 7	Walk &/or Elliptical	5	122-141 bpm	35 min	175 min
Week 8	Walk &/or Elliptical	5	122-141 bpm	40 min	200 min

+Note that when frequency (days/week) was increased, duration was either decreased or stayed the same so that only one variable was increased at a time. This prevented excessive increases in volume from week to week.

*At week 6 Heather meets the recommended 150 minutes of moderate intensity aerobic exercise per week required to achieve the health benefits, but does not meet the recommendation of 300 minutes of moderate intensity exercise per week to elicit weight loss benefits.

Note that although Heather said she has 6 hours per week to work out, 1 hour per week will be used for resistance training (2 – 30 minute sessions). Given that Heather is sedentary, it makes sense to start her at 3 days per week of aerobic training to establish a pattern of consistency, increasing the frequency after she is able to successfully exercise 3 days per week. From there she can progress exercise duration to help meet her health and weight loss goals. Heather may continue to play

basketball for 30 minutes per week.

There are many ways to write a progressive program. Heather should gradually increase the total volume of work performed each week with a goal of 300 minutes per week of moderate intensity aerobic exercise to facilitate weight loss. When her VO_{2max} improves to the Fair category after repeating the 1 Mile Walk Test, her intensity can be increased to vigorous (> 60% Heart Rate Reserve).

Resistance Training and Prescription

7. Based on Heather’s fitness assessments and occupation, what would be appropriate recommendations for resistance training? She would like to perform resistance training workouts with her trainer 2 days/week for 30 minutes. What are some areas you would like to target for resistance training?



Based on the results of her fitness assessment, Heather needs exercises to improve muscular endurance in both the core and upper body. Heather also has muscle spasms in her upper back after sitting too long. This could be related to poor posture and a lack of muscular strength and endurance in the upper back muscles.

8. Select a strength goal for Heather from the Resistance Training and Prescription section of the PHF textbook.

Heather is new to resistance training, and needs to improve muscular endurance (push up and sit up scores) and learn proper lifting technique. Therefore, a goal of improving dynamic strength is appropriate. After learning proper technique, she can gradually progress to a traditional training goal which will lead to improvements in both muscular strength and endurance.

Intensity	Sets	Reps
30-65%	2	12-17

9. List six resistance training exercises (2 upper body, 2 lower body, and 2 core) that you would include in her program along with the muscles worked.

Muscle(s) Worked	Exercise
Gluteus Maximus, Quadriceps, Hamstrings	Body Weight Squat
Pectoralis Major, Anterior Deltoid, Triceps	Dumbbell Chest Press
Gluteus Medius & Gluteus Minimus	Side Lying Clam Shell Exercise w/Circle Band
Latissimus Dorsi, Middle Trapezius, Rhomboids, Posterior Deltoid	Seated Cable Low Row
Rectus Abdominis/Obliques	Prone Plank or Modified Prone Plank
Erector Spinae	Single Limb Quadraplex

A variety of exercises could have been chosen; the above are just examples. Since Heather is performing resistance training 2 days per week, she will need a full body workout both days to meet

the minimum resistance training guidelines of working all major muscle groups 2 days per week. In this case, 2 exercises for each area of the body - upper, lower and core would work well. By alternating exercises for body parts, Heather can skip the rest periods between sets and enhance calorie burning for weight loss. Skipping the rest period between sets is known as circuit training.

Resistance Training continued

10. How would you determine the amount of resistance Heather should use for the Seated Cable Low Row and Dumbbell Chest Press?

You could have her perform a 1 RM test for each of those exercises, then use 30-65% of the 1RM to determine the amount of resistance.

Alternatively, let's assume Heather was able to do 11 repetitions to failure on the Seated Cable Low Row with 35 lbs. Using the Table in the Resistance Training and Prescription section of the textbook, 11 repetitions to failure correlates to about 71 % of her 1 RM. To estimate her 1 RM, perform the following calculation: $35 \text{ lbs} / .71 = 49 \text{ lbs}$. As noted earlier, Heather needs to start somewhere in the range of 30-65% of her 1 RM. So, let's select 50% to start (middle of the range). This would correspond to $49 \text{ lbs} \times .5 = 24.5 \text{ lbs}$. This amount of resistance should allow her to perform approximately 14 repetitions on the Seated Cable Low Row.

The other option would be to use the trial and error estimate. Using the Dumbbell Chest Press as an example, we know that her goal is to lift approximately 50% of her 1RM. This equates to a resistance she can lift approximately 14 times to failure with good form. Knowing that her goal is to work in the mid-range of repetitions to improve dynamic strength, you want to select a dumbbell that she can lift approximately 14 times with good form. So you would start with a light dumbbell (5 – 10 pounds) and see how many repetitions she can perform. If she can perform more than 14 repetitions, then select a heavier weight for the next set until you determine the amount of resistance that allows her to perform approximately 14 repetitions to fatigue. This weight corresponds to approximately 50% of her 1 RM.



Flexibility Training and Prescription

11. Given that Heather spends much of her day sitting and plays basketball once a week, list five static stretches that Heather should be doing. A review of her score on the Sit & Reach Test shows she scored in the High Fair category. This suggests that her hamstring flexibility has room for improvement. List the muscle stretched, joint action to stretch each muscle, and provide suggestions for the length of the stretch and repetitions. List some additional stretching exercises she could perform. Use the Flexibility Training and Prescription section of your PHF textbook

Given that she sits with her arms in a forward position at a computer, this leads to tight hip flexors, low back, hamstrings and anterior chest muscles (rounded shoulders posture).



Name of Stretch	Muscle Stretched	Joint Action to Stretch Selected Muscle	Duration	Repetitions
Modified Hurdler Stretch	Hamstrings	Hip Flexion with Knee Extension	30 seconds	2
Kneeling Hip Flexor Stretch	Iliopsoas	Hip Extension	30 seconds	2
Standing Calf Stretch	Gastrocnemius/ Soleus	Ankle Dorsiflexion	30 seconds	2
Chest & Anterior Shoulder Stretch	Anterior Deltoid/ Pectoralis Major	Shoulder Horizontal Abduction	30 seconds	2
Side Lying Quadriceps	Quadriceps	Knee Flexion	30 seconds	2

Also recommend that Heather take a short break for every hour of sitting that includes some light activity like walking or standing to prevent fatigue. Some of the above stretches could be performed at her desk.

Nutrition

A first step for Heather would be to track her current dietary intake using an App or the SuperTracker to develop a baseline for her eating habits and nutrient intake. Have her log at least two days during the week and one day of the weekend.



SuperTracker

The dietician recommended 1900 calories per day for Heather to lose weight safely along with increased fruit and vegetable intake.



12. Using the current RDA range for dietary fat, how many grams of fat should Heather be consuming each day?

The RDA for fat is 20-35% of total daily calories. Provide Heather with mostly monounsaturated and polyunsaturated fat options such as avocados, nuts and seeds, various oils, and fatty fish to incorporate into her diet. Remember, monounsaturated and polyunsaturated fats are the “heart healthy” fats.

$1900 \times .20 = 380$ Calories. 380 calories divided by 9 = 42 grams per day.

$1900 \times .35 = 665$ Calories. 665 calories divided by 9 = 74 grams per day.

Heather should be consuming somewhere between 42-74 grams of fat per day. She should limit her intake of saturated and trans fat.

13. Using the recommended dietary guideline of 0.36 grams of protein per pound of body weight, how many calories per day of protein should Heather consume?

$165 \text{ lbs} \times 0.36 = 59.4$ grams per day (round to 59)

$59 \text{ grams per day} \times 4 \text{ calories per gram} = 236$ calories from protein per day

Nutrition continued



14. To help Heather achieve her goal of more healthful eating, what type of general recommendations would you make for her, especially since she mentioned earlier that she finds herself eating out of vending machines at school?

- Pack vegetables and fruits for school snacks.
- Research healthy fast food options like salads and grilled chicken.
- Limit or avoid saturated fats such as dairy products made with whole milk, butter, and fatty cuts of beef and pork.
- Select healthy fats like mono and polyunsaturated fats. Cook with olive or canola oil. Choose baked or grilled fish (salmon, tuna, swordfish, etc.) and other foods high in omega-3 fatty acids for heart health.
- Avoid beverages with large amounts of simple sugars, such as soft drinks, lattes, and imitation fruit drinks.
- Consider cooking at home on the weekends and bringing her lunch to school 3 days/week.
- Consume at least 50% of her grains as whole grains.
- Reduce sodium as it may assist in lowering resting blood pressure.
- Visit ChooseMyPlate.gov for dietary recommendations and guidelines.



Behavior Change

16. Thinking about all of the information provided about Heather, what stage of change would you classify her in regards to physical activity and healthy eating?

Heather is most likely in the preparation stage for both increasing physical activity and healthy eating.

17. How might you incorporate some of the concepts in the behavior change action steps to help keep her motivated?

- Assemble a support group with friends from school.
- Set small written, short-term goals.
- Select an App to track her progress for both diet and exercise.
- Develop a list of healthy vending machine options and snacks she can bring to work/school.

