

CLIMB THROUGH TIME WORKSHEET GRADES 8 - 12

NAME _____

PARTNER'S NAME _____

1

Geological Time

- Which geological strata did your partner reach?

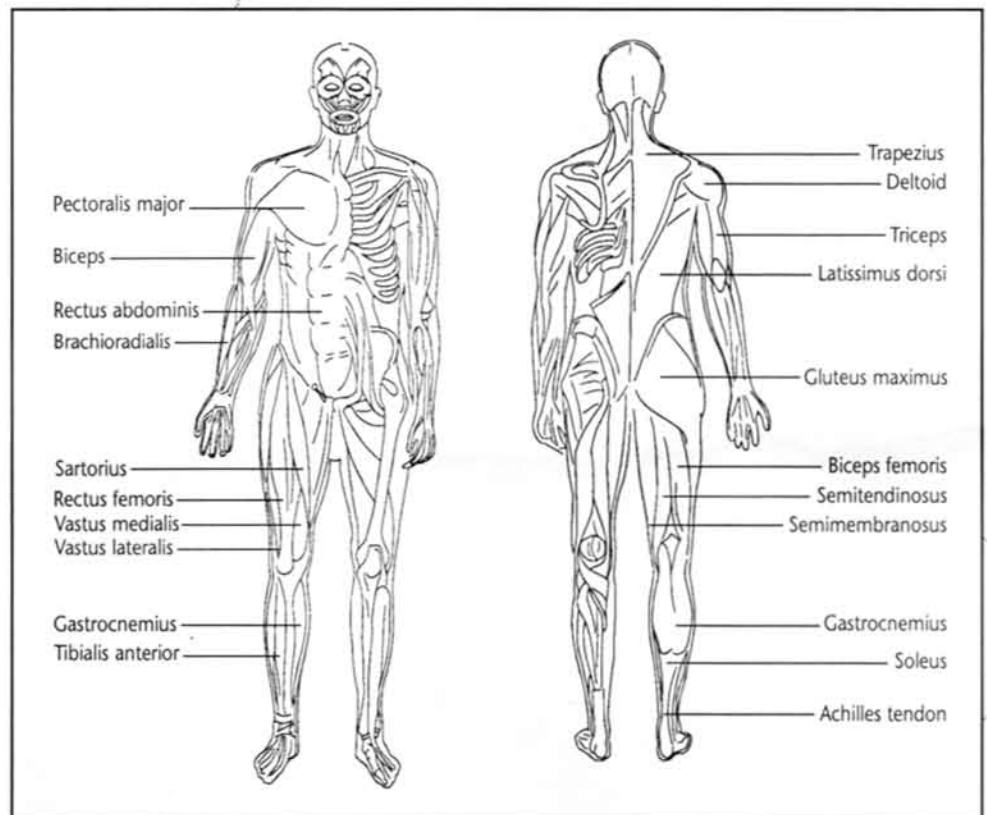
- What is the significance of this strata in Saskatchewan geological history?

Physiology of Climbing

Take a look at what the body is actually doing as a person climbs the wall.

Muscles connect to bones by stringy attachments called tendons. When we talk about how strong a muscle is, we are talking about how much **force** it can produce.

Your partner is using many different muscles to climb the wall. Using the chart below, identify the muscles your partner seems to be using as they climb.



- Which muscles provide the most force in climbing? Circle the right answer:
a. biceps and triceps b. deltoids c. pectoralis d. leg muscles

Your digestive system breaks down food that is used for **energy**. This energy is helping your partner to climb the wall. A calorie is a unit for measuring the energy value of food. As your partner climbs they are wearing off the calories they have consumed.

- Using the chart on the next page and formula below calculate the estimated calories that are burned by your partner.

| |
|---|
| Estimated calories burned per minute x time climbing (ascent) |
| = total calories burned |

Example

| | |
|--|-------------|
| Partner's weight | 115 lbs |
| Calories used per minute | 10 |
| Partner's climb time | 5 minutes |
| Calories per minute x Partner's climb time | 10 x 5 = 50 |

Total Calories Burned 50 calories

CLIMB THROUGH TIME WORKSHEET

GRADES 8 - 12

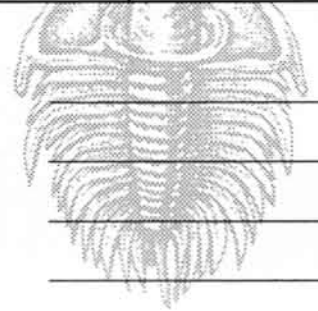
NAME _____

PARTNER'S NAME _____

2

| Weight (lbs) | Estimated Calories Burned Per Minute | Weight (lbs) | Estimated Calories Burned Per Minute |
|--------------|--------------------------------------|--------------|--------------------------------------|
| 70-85 | 7 | 160-169 | 14 |
| 86-96 | 8 | 170-179 | 15 |
| 97-109 | 9 | 180-189 | 16 |
| 110-115 | 10 | 190-199 | 17 |
| 116-130 | 11 | 200-209 | 18 |
| 131-149 | 12 | 210-219 | 19 |
| 150-159 | 13 | 220-229 | 20 |

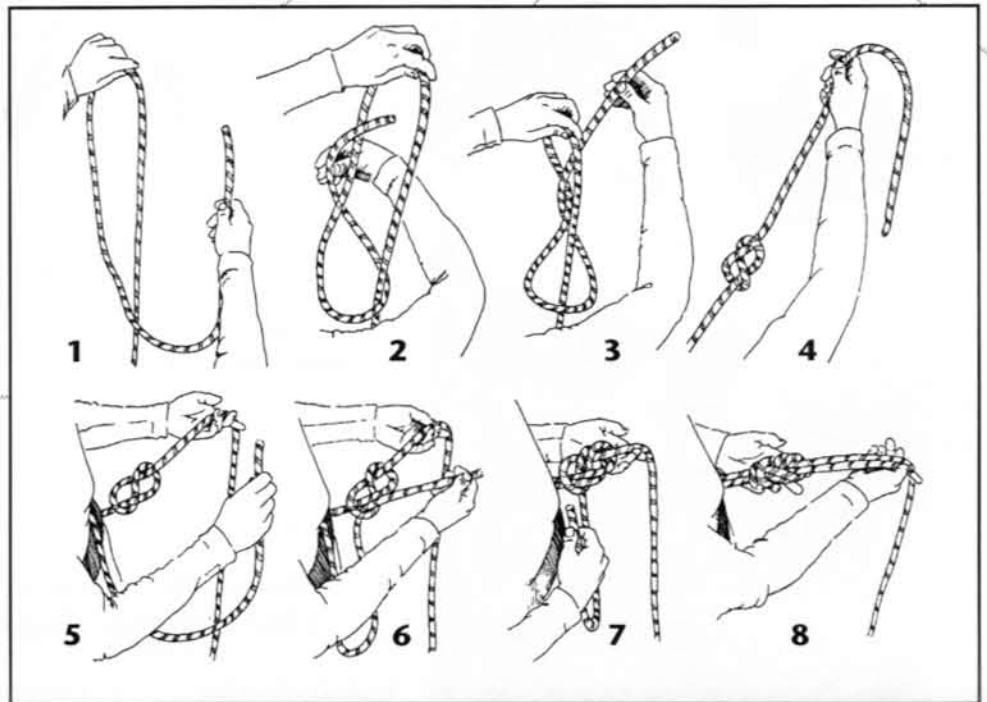
- Partner's weight _____
- Calories used per minute _____
- Partner's climb time _____
- Calories per minute x partner's climb time _____
- Total calories burned _____



Physics of Climbing

Knots

Rope is always strongest when loaded in a straight line. When you bend the rope to create a knot, the strength of the rope is reduced. Some knots are stronger than others. The Figure Eight Follow-through is one of the strongest knots, retaining 75% of the rope's strength. On the other hand, the common square knot retains only 45% of the rope's strength.



The Figure Eight Follow-through is the most popular climbing knot because it is strong, secure, and easy to visually inspect.

- Practice tying the Figure Eight-Follow through knot before you climb the wall.

Pulleys

During a long fall, a climber creates a lot of force on the rope. Have you ever wondered how a falling climber can be held by just one person (called a belayer)? The magic is in the physics of the climbing system... Principles of friction and pulleys are employed to allow the belayer to hold a falling climber with just one hand on the rope. A pulley changes a downward pull on one end of the rope into an upward pull at the other end. In addition, a friction device used in belaying a climber stops the rope from sliding freely. Observe the climbers and belayers in action.

- How many pulleys does the belayer use to hold the weight of a falling climber?



SASKATCHEWAN
SCIENCE CENTRE