This task was developed by high school and postsecondary mathematics and health sciences educators, and validated by content experts in the Common Core State Standards in mathematics and the National Career Clusters Knowledge & Skills Statements. It was developed with the purpose of demonstrating how the Common Core and CTE Knowledge & Skills Statements can be integrated into classroom learning – and to provide classroom teachers with a truly authentic task for either mathematics or CTE courses.

TASK: BMI CALCULATIONS

TARGET COMMON CORE STATE STANDARD(S) IN MATHEMATICS:
S-ID.1 Represent data with plots on the real number (dot plots, histograms, and box plots).
S-ID.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
S-ID.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
6.EE.2c Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole- number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).
6.RP.3d Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.
TARGET STANDARDS FOR MATHEMATICAL PRACTICES:
MP 1. Make sense of problems and persevere in solving them.
MP.3 Construct viable arguments and critique the reasoning of others.
MP 4. Model with mathematics.
MP 5. Use appropriate tools strategically.
MP 6. Attend to precision.
TARGET COMMON CORE STATE STANDARD(S) IN ELA/LITERACY:
RST9-10.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
RST6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6–8 texts and topics.*
RST6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
TARGET CAREER AND TECHNICAL EDUCATION (CTE) KNOWLEDGE & SKILLS STATEMENTS:
HLC03 Problem Solving and Critical Thinking: Solve problems using critical thinking skills (analyze, synthesize, and evaluate) independently and in teams. Solve problems using creativity and innovation.
HLC06.01.06 Describe healthy behaviors.
HLPA03.01.01 Collect patient/client information compliant with facility and regulatory guidelines.
RECOMMENDED COURSE(S):
Algebra I or II, Integrated Math I, II, or III, Statistics/Probability; Introduction to Health Science
ADDITIONAL INSTRUCTIONS:
Task could include a cooperative work education environment with teams and research groups. The level of rigor can be increased or decreased depending on the scaffolding provided for the students.

About the Common Core State Standards in Mathematics

The Common Core State Standards (CCSS) for Mathematics are organized by grade level in grades K–8. At the high school level, the standards are organized by conceptual category (number and quantity, algebra, functions, geometry, and probability and statistics), showing the body of knowledge students should learn in each category to be college and career ready, and to be prepared to study more advanced mathematics. The Standards for Mathematical Practice describe ways in which developing student practitioners of the discipline of mathematics increasingly ought to engage with the subject matter as they grow in mathematical maturity and expertise throughout the elementary, middle and high school years. www.corestandards.org

About the Common Core State Standards in English Language Arts/Literacy

The Common Core State Standards (CCSS) for ELA/Literacy are organized by grade level in grades K–8. At the high school level, the standards are organized by 9-10 and 11-12 grade bands. Across K-12 there are four major strands: Reading, Writing, Speaking and Listening, and Language. The CCSS also include Standards for Literacy in History/Social Studies, Science, and Technical Subjects, with content-specific (Reading and Writing) literacy standards provided for grades 6-8, 9-10, and 11-12, to demonstrate that literacy needs to be taught and nurtured across all subjects. www.corestandards.org

About the Career Cluster Knowledge and Skill Statements

As an organizing tool for curriculum design and instruction, Career Clusters™ provide the essential knowledge and skills for the 16 Career Clusters™ and their Career Pathways. It also functions as a useful guide in developing programs of study bridging secondary and postsecondary curriculum and for creating individual student plans of study for a complete range of career options. As such, it helps students discover their interests and their passions, and empowers them to choose the educational pathway that can lead to success in high school, college and career. http://www.careertech.org/career-clusters/resources/clusters/health.html. Although not included in this template, all Clusters and Pathways have Foundational Academic Expectations and Essential Knowledge & Skills Statements, which, in some cases, overlap with the Common Core State Standards.

BMI CALCULATIONS – *The Task*

The prevalence of obesity is increasing to epidemic proportions among young people and adults globally. The Body Mass Index (BMI) is a useful and inexpensive means to measure whether young people and adults are underweight, overweight, or obese. In the following exercise you will collect data, perform mathematical operations using box plots and tables to describe the distribution of scores for sample populations, and analyze and interpret results.

Sampling Note: *The BMI does not take into account frame size and muscularity of individuals. The BMI is not an appropriate measure of body index for young children, athletes, and the elderly suffering from illnesses. Do not include these individuals in your sample population.*

1. Collect data by asking three female family members, friends, relatives, or neighbors for their weight and height (maintaining anonymity). Using the formula below, calculate the BMI for each individual, and compare and contrast the results.

$$BMI = M \div H^2$$ [Mass (kg) divided by the square of the height (m)]

BMI formula is calculated in SI Units (International System of Units) where M = Mass (weight) in kilograms and H = Height in meters

Conversions 39.36 inches = 1 meter; 2.202 lbs = 1 Kilogram (kg)

Complete the table below with the information you collect:

Person (Maintain anonymity by using a number)	**Height in Inches**	**Height in Meters**	**Mass/Weight in Pounds**	**Mass/Weight in Kilograms**	**Calculated BMI**
1					
2					
3					

2. Consolidate the data collected by each member of your class into one table. Use this data to create a box plot (sometimes called a box-and-whisker plot) that visually represents the derived BMI data. You may use either the following chart or a spreadsheet as you determine the five-number summary that will help you create the box plot.

Min	Q1	Median (Q2)	Q3	Max

Steps to determine the *five-number summary for your BMI data set:*

1. Enter or list the numbers
2. Sort the numbers by ascending order (lowest to highest)
3. Identify the Minimum
4. Identify the Maximum
5. Determine the Median (Q2)
6. Determine the Median of the lower half of the list – First Quartile (Q1)
7. Determine the Median of the upper half of the list – Third Quartile (Q3)

3. Repeat the box plot creation for the celebrity data provided below, and celebrity data collected by the student. For weight spans use the mean of the two extremes provided.

Celebrity Name	Height in Feet and Inches	Mass/Weight in Pounds	Calculated BMI
Jason Momoa (Aquaman)	6'4"	214 lbs.	
Meghan Markle	5'7"	123 lbs.	
Mindy Lahiri	5'4"	143 lbs.	

4. Interpret differences in shape, center, and spread (*i.e.,* range (Max- Min) and interquartile range (Q3-Q1)) in the context of the two data sets. Determine and discuss the skewness of the data.

a. Discuss the possible effects of outliers compared to the normal ranges of BMI.

b. Compare the two groups to the normal range categories provided below and identify impacts of these differences to the health and lifestyle of the groups.

BMI Score Less than 18.5 ~ Underweight
BMI Score of 18.5 to 24.9 ~ Normal weight
BMI Score of 25 to 29.9 ~ Overweight
BMI Score Greater than 30 ~ Obesity

5. Calculate and compare your own BMI to the normal range chart provided. What insights have you discovered into your own health and lifestyle?

6. A 17-year-old female high school student feels that she is overweight. Her weight is 145 lbs and height is 5’4”. Construct a logical argument to support or refute concerns about her lifestyle choices.

Body Mass Index (BMI) Chart for Adults

Obese (>30) | Overweight (25-30) | Normal (18.5-25) | Underweight (<18.5)

HEIGHT in feet/inches and centimeters

WEIGHT		4'8"	4'9"	4'10"	4'11"	5'0"	5'1"	5'2"	5'3"	5'4"	5'5"	5'6"	5'7"	5'8"	5'9"	5'10"	5'11"	6'0"	6'1"	6'2"	6'3"	6'4"	6'5"
lbs	(kg)	142cm		147	150	152	155	157	160	163	165	168	170	173	175	178	180	183	185	188	191	193	196
260	**(117.9)**	**58**	**56**	**54**	**53**	**51**	**49**	**48**	**46**	**45**	**43**	**42**	**41**	**40**	**38**	**37**	**36**	**35**	**34**	**33**	**32**	**32**	**31**
255	(115.7)	57	55	53	51	50	48	47	45	44	42	41	40	39	38	37	36	35	34	33	32	31	30
250	**(113.4)**	**56**	**54**	**52**	**50**	**49**	**47**	**46**	**44**	**43**	**42**	**40**	**39**	**38**	**37**	**36**	**35**	**34**	**33**	**32**	**31**	**30**	**30**
245	(111.1)	55	53	51	49	48	46	45	43	42	41	40	38	37	36	35	34	33	32	31	31	30	29
240	**(108.9)**	**54**	**52**	**50**	**48**	**47**	**45**	**44**	**43**	**41**	**40**	**39**	**38**	**36**	**35**	**34**	**33**	**33**	**32**	**31**	**30**	**29**	**28**
235	(106.6)	53	51	49	47	46	44	43	42	40	39	38	37	36	35	34	33	32	31	30	29	29	28
230	**(104.3)**	**52**	**50**	**48**	**46**	**45**	**43**	**42**	**41**	**39**	**38**	**37**	**36**	**35**	**34**	**33**	**32**	**31**	**30**	**30**	**29**	**28**	**27**
225	(102.1)	50	49	47	45	44	43	41	40	39	37	36	35	34	33	32	31	31	30	29	28	27	27
220	**(99.8)**	**49**	**48**	**46**	**44**	**43**	**42**	**40**	**39**	**38**	**37**	**36**	**34**	**33**	**32**	**32**	**31**	**30**	**29**	**28**	**27**	**27**	**26**
215	(97.5)	48	47	45	43	42	41	39	38	37	36	35	34	33	32	31	30	29	28	28	27	26	25
210	**(95.3)**	**47**	**45**	**44**	**42**	**41**	**40**	**38**	**37**	**36**	**35**	**34**	**33**	**32**	**31**	**30**	**29**	**28**	**28**	**27**	**26**	**26**	**25**
205	(93.0)	46	44	43	41	40	39	37	36	35	34	33	32	31	30	29	29	28	27	26	26	25	24
200	**(90.7)**	**45**	**43**	**42**	**40**	**39**	**38**	**37**	**35**	**34**	**33**	**32**	**31**	**30**	**30**	**29**	**28**	**27**	**26**	**26**	**25**	**24**	**24**
195	(88.5)	44	42	41	39	38	37	36	35	33	32	31	31	30	29	28	27	26	26	25	24	24	23
190	**(86.2)**	**43**	**41**	**40**	**38**	**37**	**36**	**35**	**34**	**33**	**32**	**31**	**30**	**29**	**28**	**27**	**26**	**26**	**25**	**24**	**24**	**23**	**23**
185	(83.9)	41	40	39	37	36	35	34	33	32	31	30	29	28	27	27	26	25	24	24	23	23	22
180	**(81.6)**	**40**	**39**	**38**	**36**	**35**	**34**	**33**	**32**	**31**	**30**	**29**	**28**	**27**	**27**	**26**	**25**	**24**	**24**	**23**	**22**	**22**	**21**
175	(79.4)	39	38	37	35	34	33	32	31	30	29	28	27	27	26	25	24	24	23	22	22	21	21
170	**(77.1)**	**38**	**37**	**36**	**34**	**33**	**32**	**31**	**30**	**29**	**28**	**27**	**27**	**26**	**25**	**24**	**24**	**23**	**22**	**22**	**21**	**21**	**20**
165	(74.8)	37	36	34	33	32	31	30	29	28	27	27	26	25	24	24	23	22	22	21	21	20	20
160	**(72.6)**	**36**	**35**	**33**	**32**	**31**	**30**	**29**	**28**	**27**	**27**	**26**	**25**	**24**	**24**	**23**	**22**	**22**	**21**	**21**	**20**	**19**	**19**
155	(70.3)	35	34	32	31	30	29	28	27	27	26	25	24	24	23	22	22	21	20	20	19	19	18
150	**(68.0)**	**34**	**32**	**31**	**30**	**29**	**28**	**27**	**27**	**26**	**25**	**24**	**23**	**23**	**22**	**22**	**21**	**20**	**20**	**19**	**19**	**18**	**18**
145	(65.8)	33	31	30	29	28	27	27	26	25	24	23	23	22	21	21	20	20	19	19	18	18	17
140	**(63.5)**	**31**	**30**	**29**	**28**	**27**	**26**	**26**	**25**	**24**	**23**	**23**	**22**	**21**	**21**	**20**	**20**	**19**	**18**	**18**	**17**	**17**	**17**
135	(61.2)	30	29	28	27	26	26	25	24	23	22	22	21	21	20	19	19	18	18	17	17	16	16
130	**(59.0)**	**29**	**28**	**27**	**26**	**25**	**25**	**24**	**23**	**22**	**22**	**21**	**20**	**20**	**19**	**19**	**18**	**18**	**17**	**17**	**16**	**16**	**15**
125	(56.7)	28	27	26	25	24	24	23	22	21	21	20	20	19	18	18	17	17	16	16	16	15	15
120	**(54.4)**	**27**	**26**	**25**	**24**	**23**	**23**	**22**	**21**	**21**	**20**	**19**	**19**	**18**	**18**	**17**	**17**	**16**	**16**	**15**	**15**	**15**	**14**
115	(52.2)	26	25	24	23	22	22	21	20	20	19	19	18	17	17	16	16	16	15	15	14	14	14
110	**(49.9)**	**25**	**24**	**23**	**22**	**21**	**21**	**20**	**19**	**19**	**18**	**18**	**17**	**17**	**16**	**16**	**15**	**15**	**15**	**14**	**14**	**13**	**13**
105	(47.6)	24	23	22	21	21	20	19	19	18	17	17	16	16	16	15	15	14	14	13	13	13	12
100	**(45.4)**	**22**	**22**	**21**	**20**	**20**	**19**	**18**	**18**	**17**	**17**	**16**	**16**	**15**	**15**	**14**	**14**	**14**	**13**	**13**	**12**	**12**	**12**
95	(43.1)	21	21	20	19	19	18	17	17	16	16	15	15	14	14	14	13	13	13	12	12	12	11
90	**(40.8)**	**20**	**19**	**19**	**18**	**18**	**17**	**16**	**16**	**15**	**15**	**15**	**14**	**14**	**13**	**13**	**13**	**12**	**12**	**12**	**11**	**11**	**11**
85	(38.6)	19	18	18	17	17	16	16	15	15	14	14	13	13	13	12	12	12	11	11	11	10	10
80	**(36.3)**	**18**	**17**	**17**	**16**	**16**	**15**	**15**	**14**	**14**	**13**	**13**	**13**	**12**	**12**	**11**	**11**	**11**	**11**	**10**	**10**	**10**	**9**

Note: BMI values rounded to the nearest whole number. BMI categories based on CDC (Centers for Disease Control and Prevention) criteria.

www.vertex42.com BMI = Weight[kg] / (Height[m] x Height[m]) = 703 x Weight[lb] / (Height[in] x Height[in])

BMI CALCULATIONS – *Possible Solutions*

1. *Collect data by asking three female family members, friends, relatives, or neighbors for their weight and height (maintaining anonymity). Using the formula below, calculate the BMI for each individual, and compare and contrast the results.*

Using the SI BMI formula: *M = Mass (weight) in kilograms*
H = Height in meters
Conversions 39.36 inches = 1 meter 2.202 lbs = 1 Kilogram (kg)

BMI = $M \div H^2$ *[Mass (kg) divided by the square of the height (m)]*

Here is one example of a completed table:

Person	Height in Inches	Height in Meters	Mass/Weight in Pounds	Mass/Weight in Kilograms	BMI Calculation
1	5'5" = 65"	1.65 m	128 lbs	58.1 kg	$58 / 1.65^2 = 21.3$
2	5'2" = 62"	1.58 m	137 lbs	62.2 kg	$52.2 / 1.58^2 = 24.9$
3	5'11" = 71"	1.80 m	129 lbs	58.6 kg	$58.6 / 1.8^2 = 18.1$

(The teacher might provide students with the attached Body Mass Index Chart for Adults to be used for calculating the BMI.)

2. *Consolidate the data collected by each member of your class into one table. Use this data to create a box plot (sometimes called a box-and-whisker plot) that visually represents the derived BMI data. You may use either the following chart or a spreadsheet as you determine the five-number summary that will help you create the box plot.*

Min	Q1	Median (Q2)	Q3	Max

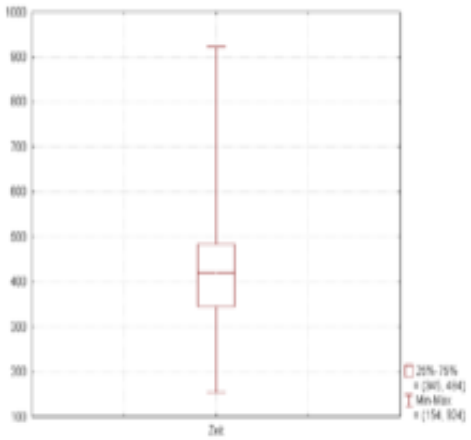
Options to complete a five number summary include the following:

- Excel can be used to determine the five-number summary, but this spreadsheet application does not create the box plot without the add-in enabled.
- A graphing calculator can be used to determine the five-number summary and the box plot.
- An online program called "StatCrunch" can be used to determine the five-number summary and box plot.

3. *Repeat the box plot creation for the celebrity data provided below. For weight spans use the mean of the two extremes provided.*

Celebrity Name	Height in Feet and Inches	Mass/Weight in Pounds	BMI
Jason Momoa (Aquaman)	6'4"	214 lbs.	
Meghan Markle	5'7"	123 lbs.	
Mindy Lahiri	5'4"	143 lbs.	

Below is a sample box plot (http://en.wikipedia.org/wiki/File:Box-Plot_mit_Min-Max_Abstand.png) taken from Wikipedia, included to show what a box plot looks like. This sample is not intended to depict any of the sample data included in this set of possible solutions.



NOTE: Box plots may be represented vertically or horizontally.

4. *Interpret differences in shape, center, and spread (i.e., range (Max- Min) and interquartile range (Q3-Q1)) in the context of the two BMI data sets. Determine and discuss the skewness of the data.*

Sample student response: It is likely that the collected heights and weights will result in larger BMI's than those determined from the heights and weights of celebrities the celebrities selected. It might also be the case that there is greater variation in the student-collected samples than there is in the population sample of celebrities. It is also likely that celebrity data might be skewed right since most of the observations are likely on the low end of the scale.

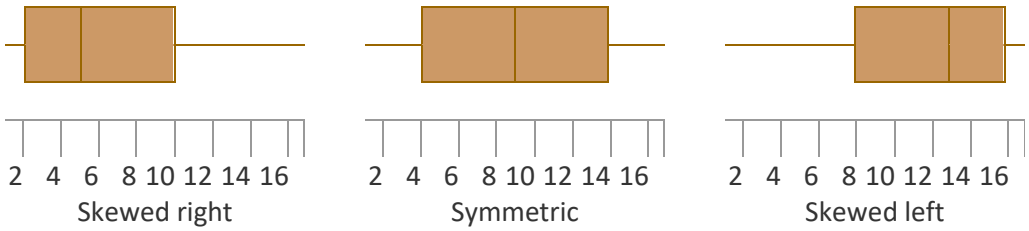
Teacher Note (extracted from Wolfram Demonstrations Project)
http://demonstrations.wolfram.com/ExploringSkewnessInBoxPlots/

In judging skewness of data represented by box plots, positive skewness (or right-skewed) distributions are often indicated by $Q_3 - m > Q_1 - m$, which is usually apparent from inspection of the box plot. Using Q_1, Q_2, and Q_3 in this way is not a reliable way to judge skewness when the sample size is not large, as in $n = 20$ or $n = 50$.

Skewness is more reliably indicated visually by the relative size of the whiskers. A large positive whisker relative to the negative whisker is a better indication of positive skewness. Similarly, the whiskers may be used for judging symmetry and negative skewness.

Teacher Note (extracted from http://stattrek.com/statistics/charts/boxplot.aspx)

Box plots often provide information about the shape of a data set. The examples below show some common patterns.



Each of the above box plots illustrates a different skewness pattern. If most of the observations are concentrated on the low end of the scale, the distribution is skewed right; and vice versa. If a distribution is symmetric, the observations will be evenly split at the median, as shown above in the middle figure.

The discussion of skewness will depend on the results of the data collected.

a. *Discuss the possible effects of outliers compared to the normal ranges of BMI.*

Possible response: Outliers can change the median and quartile values. They will result in longer whiskers on the box-and-whisker plot.

b. *Compare the two groups to the normal range categories provided and identify impacts of these differences to the health and lifestyle of the groups.*

BMI Score Less than 18.5 ~	Underweight
BMI Score of 18.5 to 24.9 ~	Normal weight
BMI Score of 25 to 29.9 ~	Overweight
BMI Score Greater than 30 ~	Obesity

Answers will depend on the data collected and on the full celebrity data set used.

5. *Calculate and compare your own BMI to the normal range chart provided. What insights have you discovered into your own health and lifestyle?*

Results will vary for each student. Check calculations for unit conversion and for BMI calculation.

NOTE: See the Body Mass Index Chart for Adults at the end of these solutions for a teacher resource that can be useful in checking the reasonableness of a student's calculations.

6. *A 17-year-old female high school student feels that she is overweight. Her weight is 145 lbs and height is 5'4". Construct a logical argument to support or refute concerns about her lifestyle choices.*

This student's BMI can be found as follows:

145 lbs * 1k / 2.202 lbs = 65.9 k
5'4" = 64" 64" * 1 m / 39.36" = 1.63 m

BMI = 65.9 / 1.63^2 = 24.8

Possible response: This female is very close to the overweight category. A change in exercise and/or eating habits could improve her BMI to somewhere near the center of the Normal range. In order to reach that goal she would need to reduce her weight to between 125 and 130 lbs.

BMI CALCULATIONS – *Extensions*

The extensions below represent potential ways in which mathematics and/or CTE teachers can build on the task above. All of the extensions are optional and can be used in the classroom, as homework assignments, and/or as long-term interdisciplinary projects.

1. Which measures of variability are most applicable in these tasks and why?

2. Use the mean and standard deviation of the data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.

3. Define how Basal Metabolic Rate (BMR) is an essential part of defining caloric intake.

4. Determine your personal BMR with the Internet-based formula to achieve the recommended caloric intake.

   English BMR Formula
   Women: BMR = 655 + (4.35 x weight in pounds) + (4.7 x height in inches) - (4.7 x age in years)
   Men: BMR = 66 + (6.23 x weight in pounds) + (12.7 x height in inches) - (6.8 x age in year)

   Metric BMR Formula
   Women: BMR = 655 + (9.6 x weight in kilos) + (1.8 x height in cm) - (4.7 x age in years)
   Men: BMR = 66 + (13.7 x weight in kilos) + (5 x height in cm) - (6.8 x age in years)

5. Research eating behaviors to reduce individual BMI.

6. Create healthy menus for 7 days that will reflect the caloric intake for reducing the BMI at a healthy rate.

7. Identify other subsets of celebrities for comparison to the class data collected.

8. Investigate the alternative methods for calculating BMI. Determine if the results would be the same.

BMI CALCULATIONS – *Appendix: Alignment Ratings*

The rating system used in the following charts is as follows:

3 EXCELLENT ALIGNMENT:
The content/performance of the task is clearly consistent with the content/performance of the Common Core State Standard.

2 GOOD ALIGNMENT:
The task is consistent with important elements of the content/performance of the CCSS statement, but part of the CCSS is not addressed.

1 WEAK ALIGNMENT:
There is a partial alignment between the task and the CCSS, however important elements of the CCSS are not addressed in the task.

N/A:
For Mathematical Practices a content rating does not apply.

In the charts **C = Content Rating** and **P = Performance Rating**

Task-to-Mathematical Practice Alignment Recording Sheet

Task Name	Aligned CCSS Mathematical Practice Standards	C	P	Alignment Comments (Standards selection, partial alignments, reasons for rating, etc)
BMI CALCULATIONS	**MP 1.** Make sense of problems and persevere in solving them.	N/A	3	For this task students analyze the given formula, the constraints, relationships, and goals of the task. They must make conjectures about the form and meaning of the solution and plan a solution pathway. They must check the reasonableness of their solution, continually asking themselves, "Does this make sense?" While the task requires routine math, the student must persevere in the data collection and analysis.
	MP.3 Construct viable arguments and critique the reasoning of others.	N/A	2	This task asks students to construct an argument, specifically in Question 6, but not to critique the reasoning of others.
	MP 4. Model with mathematics.	N/A	3	While the algebraic model for determining BMI is provided in the task, there is a requirement to use data collected to create a graphic display of the data. Use of graphs, charts, and formulas to analyze relationships and drawing conclusions from all of the above is required.
	MP 5. Use appropriate tools strategically.	N/A	3	The use of the website, graphing calculator, and other devices provides an opportunity to integrate technology with this activity. The task may be weakened in performance if technology is not used. The task would also be expedited with the use of technology.
	MP 6. Attend to precision.	N/A	3	Students must use precise units of measure, convert units, label the axes, and perform calculations to convert units from standard to metric.

Task-to-Common Core State Standards Alignment Recording Sheet

Task Name	Aligned CCSS Content Standards	C	P	Alignment Comments (Standards selection, partial alignments, reasons for rating, etc.)
BMI CALCULATIONS	**S-ID.1** Represent data with plots on the real number (dot plots, histograms, and box plots).	3	3	The task requires the creation of a box-plot wit the data collected.
	S-ID.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.	3	3	In question 2 of this task, students must create a box-plot using the min, max, median, and first- and third-quartiles. They compare the class's collected data to the celebrity data. In the weight spans provided with the celebrity data, students must find and use the mean of the two extreme weights. Students are also asked, in Question 4, to interpret the differences in shape, center, and spread of dat
	S-ID.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	3	3	Students are asked to discuss the possible effects of outliers when compared to normal BMI's in Question 4 of the task, in addition to more general interpretation of shape, center, and spread.
	6.EE.2c Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole- number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).	3	3	As students build their BMI tables, they must evaluate the BMI formula for the measurements they collect and for the celebrities referenced in Question 3.
	6.RP.3d Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.	3	3	Since the BMI formula uses kilograms and meters for the measurements, students must either collect their measurements using the metric system or convert from English to metric. If they collect using the metric system, this standard would be less applicable.

Task-to-National Career Cluster Knowledge & Skills Statements Alignment Recording Sheet

Task Name	Aligned National Career Cluster Knowledge & Skills Statements	C	P	Alignment Comments
BMI CALCULATIONS	**HLC03** Problem Solving and Critical Thinking: Solve problems using critical thinking skills (analyze, synthesize, and evaluate) independently and in teams. Solve problems using creativity and innovation.	N/A	3	The task requires students to analyze, collect, compare, and evaluate data to understand the range of factors for and implications of Body Mass Index.
	HLC06.01.06 Describe healthy behaviors.	1	N/A	Use of a BMI screening tool chart exists in the content, but there are no performances associated with describing healthy behaviors in the task.

	HLPA03.01.01 Collect patient/client information compliant with facility and regulatory guidelines.	**2**	**3**	Maintaining confidentiality according to facility protocol is part of the task. The collection is not of actual patients, but procedurally it meets the standard's expectations.