Weight Lifting Questions

Weightlifting develops strength and muscle power. Weightlifting requires accurate technique to avoid injury. Whilst a sport in its own right, it is often adopted by other sportspeople in their strength training programmes. Watch the following video clips and answer the specific questions to gain a better understanding of this sport.

Quintic Video Files you will use for these questions:
1) **Bench_Press_SV**
2) **Bench_Press_FV**
3) **Clean_FV**
4) **Clean_SV**
5) **Squat_FV**
6) **Squat_SV**
7) **Deadlift_FV**
8) **Deadlift_SV**
9) **Snatch_SV**

PLAY AND PAUSE

Open the video file 'Squats_SV'

1) Play the video at all the different speeds. Imagine you are coaching a weightlifter. You would vary the speed at which you view the video footage if you were concentrating on the correction of different aspects of the technique.

   (i) At which speed would you choose to view the lifters technique if you were assessing the degree of flexion at the lifters knee? Explain your answer

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(ii) At which speed would you choose to view the technique if you were
assessing the smoothness of the technique? Explain your answer.

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Open the video file 'squat_FV'in the Main window

2) Play the video and write a description of the squat technique using the
following frames as a guideline.

(i)   Frames 0

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(ii)   Frames 1-89

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(iii)   Frames 89-172

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TIMING

Open the video 'Clean_SV'

3) Set your markers at frames 0, 19, 22, 26, 30, 55.

These frames mark significant points during the action and you can use the stopwatch function to find the time differences between these points.

Use the options from the red box to complete the table below matching up the frame numbers, description of key frames and time differences.

Frame number	Descriptions	Time Differences
• 0	• Finish position	• 0.16 secs
• 19	• Heels off floor	• 0.12 secs
• 22	• Bar passes knees	• 1.00 secs
• 26	• Elbows under bar	• 0.16 secs
• 30	• Start position	• 0.76 secs
• 55	• Bar at hip height	

Frame number	Description	Time Difference

ANGLES AND SHAPES

Open the video file 'Benchpress_FV'

4)

(i)   For the following frames draw the interior angle of the left elbow
and write down its value: (do this by joining the points of the
shoulder, elbow and wrist joints using this button)

Frame 0: ....
Frame 13: ....
Frame 22: ....
Frame 64: ....
Frame 71: ....
Frame 82: ....

Open the video file 'Deadlift_SV'

5) Play the video through and familiarise yourself with the dead lift technique.

(i)   Pause the video at the following frames and draw a red circle
around the weight on the bar.

Frame 0:
Frame 20:
Frame 40:
Frame 60:
Frame 80:
Frame 170:
Frame 190:
Frame 210:
Frame 230:
Frame 250:

(ii)   What do you notice about the path of the weight throughout the movement? Write a brief description.

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BLEND

Open the video 'Clean_FV'

6) Watch the video several times and familiarise yourself with the Clean technique

(i)   Pause the video at frame 0.

(ii)   **'Set Background'** at frame 0 so it can be used in the Blend function.

(iii)   How has the lifter changed his body shape compared to the background in:

Frame 40?

………………………………………………………………………

………………………………………………………………………

Frame 60

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………………………………………………………………………

………………………………………………………………………

Frame 73?

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Frame 84?

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Frame 154?

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OVERLAY

Open the video 'Snatch_SV' in the Main window

Open the video 'Deadlift_SV' in the Best window.

7)
- (i) Scroll the video in the main window to frame 0
- (ii) Scroll the video in the best window to frame 0
- (iii) Synchronise the videos and press the 'Set Overlay' button under the Blend tab in the Main window.
- (iv) Watch the lifters throughout their technique frame-by-frame.
- (v) As you can see the two lifts have different techniques.
- (vi) At each of the following frame, name one similarity and one difference you notice about the techniques.

Frame	Similarity	Difference
7		
21		
31		
37		
43		
57		
75		

PHOTO SEQUENCE

Open the video 'Squat_SV'

8)

    (i)   Create a 9 frame 'Multiple-Screen Capture', showing the technique of the squat.

    (ii)   Draw the angle of the right knee on each of the captured frames with a text box in the bottom right hand corner stating the value of the angle. (See example below)

    (iii)   Save this 'Multiple-Screen Capture' as a JPEG.

    (iv)   Open this JPEG in Microsoft Word and give it an appropriate title including your name.

    (v)   Ask you teacher if you may print it.

DIGITISATION – (Quintic Coaching & Biomechanics only)

Open the video 'Squat_FV'

9) A digitisation template has already been completed for this video, which tracks the whole of the lifter's body.

    (i)   Start a new trace.

    (ii)   Load the digitisation template **weightlifting.qrm** from the weightlifting video file.

    (iii)   Complete the digitisation trace for frames 5-160.

    (iv)   Save the trace.

    (v)   Which buttons are used in combination to create the following pictures? (Hint: the captured frame is number 75.)
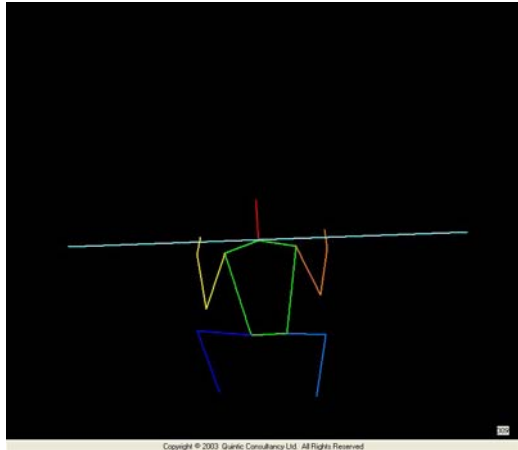
a)
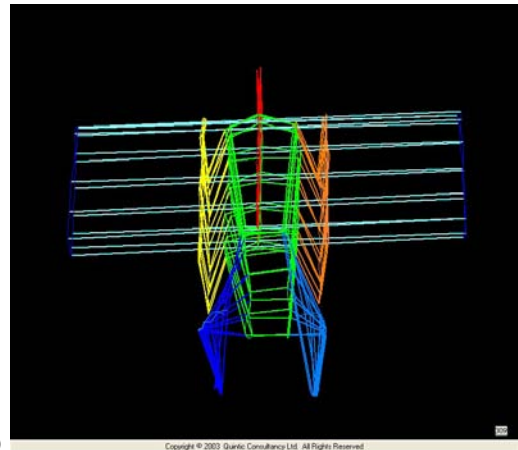
b)
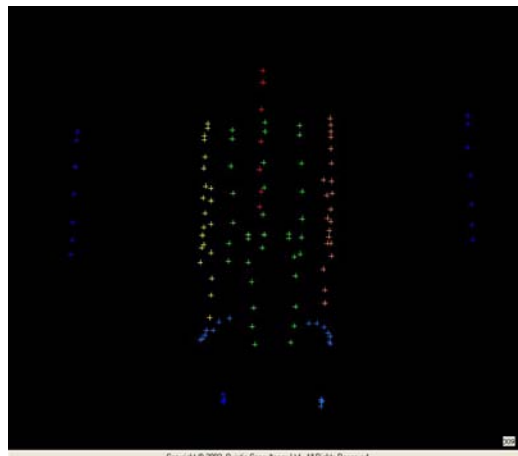
c)
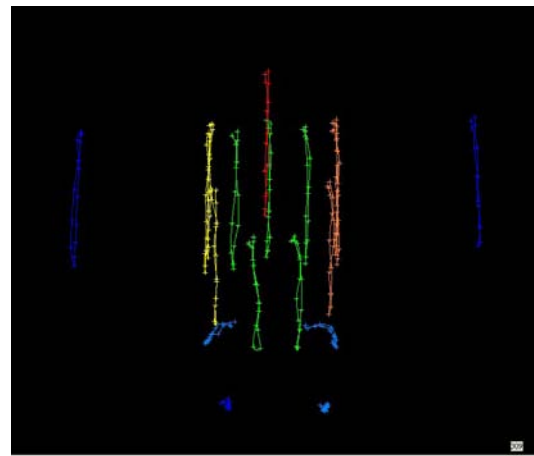
d)

10) The video was calibrated by knowing the length of the Olympic bar.

(i)　　What is the purpose of calibration?

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(ii)　　Use the ruler function ⟶ 🎞 to find the lengths of the following body segments (body segments are measured from joint to joint - i.e. shoulder to elbow for the upper arm)

(iii)

Body Segment	Length (m)
Thigh	
Lower leg	
Forearm	
Olympic bar	
Upper arm	

11)

    (i) Open the analysis window.

    (ii) Fill in the tables with the correct number of stars to produce the following graphs. Choose 1 star, 2 stars or 0 stars for each box:

  a) Horizontal acceleration of all points **without** exact values displayed.
Acceleration of the left elbow **with** exact values displayed.
Velocity of the left wrist **without** exact values displayed.

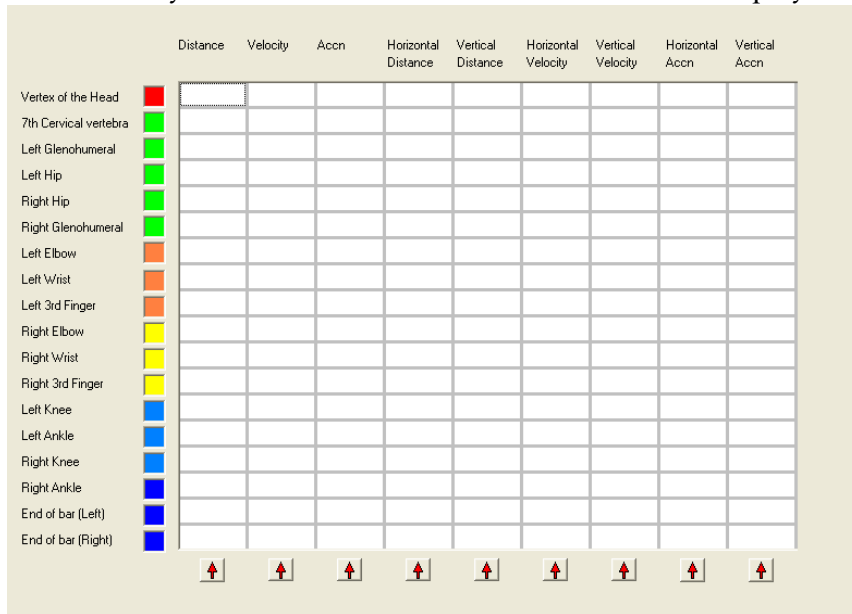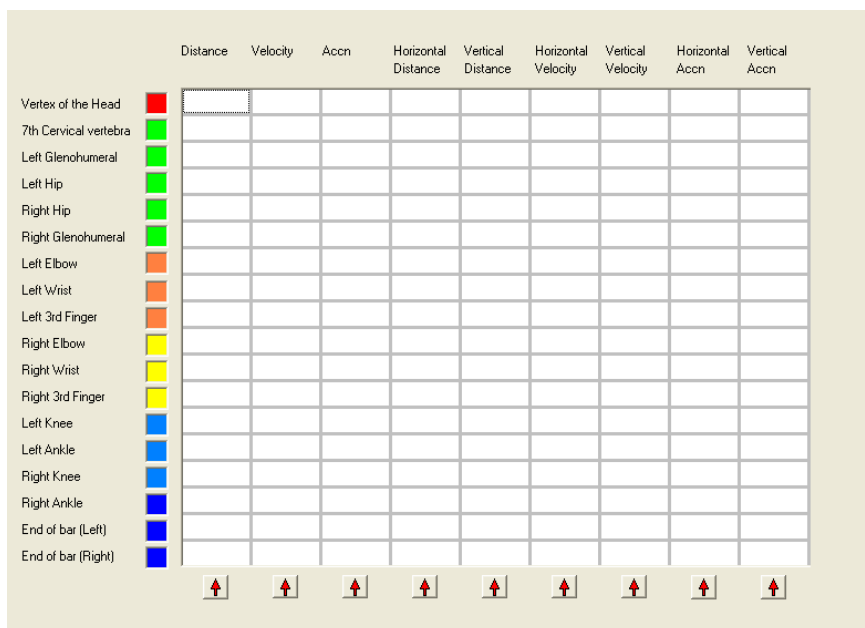|	Distance	Velocity	Accn	Horizontal Distance	Vertical Distance	Horizontal Velocity	Vertical Velocity	Horizontal Accn	Vertical Accn
Vertex of the Head									
7th Cervical vertebra									
Left Glenohumeral									
Left Hip									
Right Hip									
Right Glenohumeral									
Left Elbow									
Left Wrist									
Left 3rd Finger									
Right Elbow									
Right Wrist									
Right 3rd Finger									
Left Knee									
Left Ankle									
Right Knee									
Right Ankle									
End of bar (Left)									
End of bar (Right)									

  b) Vertical distance of all points **without** exact values displayed.
Horizontal acceleration of all points **with** exact values displayed.
Distance of the left shoulder **without** exact values displayed.

	Distance	Velocity	Accn	Horizontal Distance	Vertical Distance	Horizontal Velocity	Vertical Velocity	Horizontal Accn	Vertical Accn
Vertex of the Head									
7th Cervical vertebra									
Left Glenohumeral									
Left Hip									
Right Hip									
Right Glenohumeral									
Left Elbow									
Left Wrist									
Left 3rd Finger									
Right Elbow									
Right Wrist									
Right 3rd Finger									
Left Knee									
Left Ankle									
Right Knee									
Right Ankle									
End of bar (Left)									
End of bar (Right)									

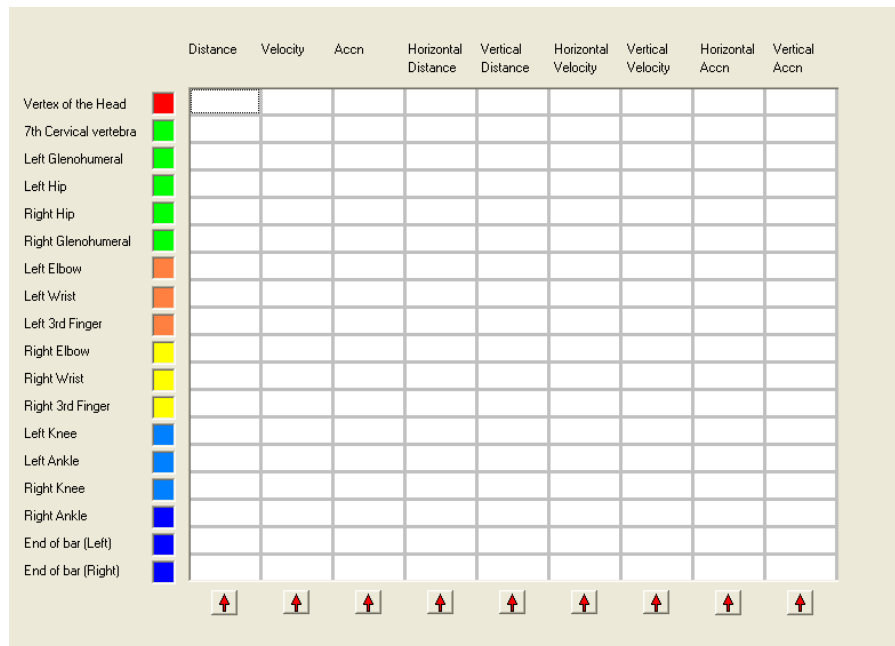c) Velocity of the left toe and left ankle **with** exact values displayed. Vertical distance of all points **without** exact values displayed. Horizontal acceleration of the left wrist **without** exact values displayed.
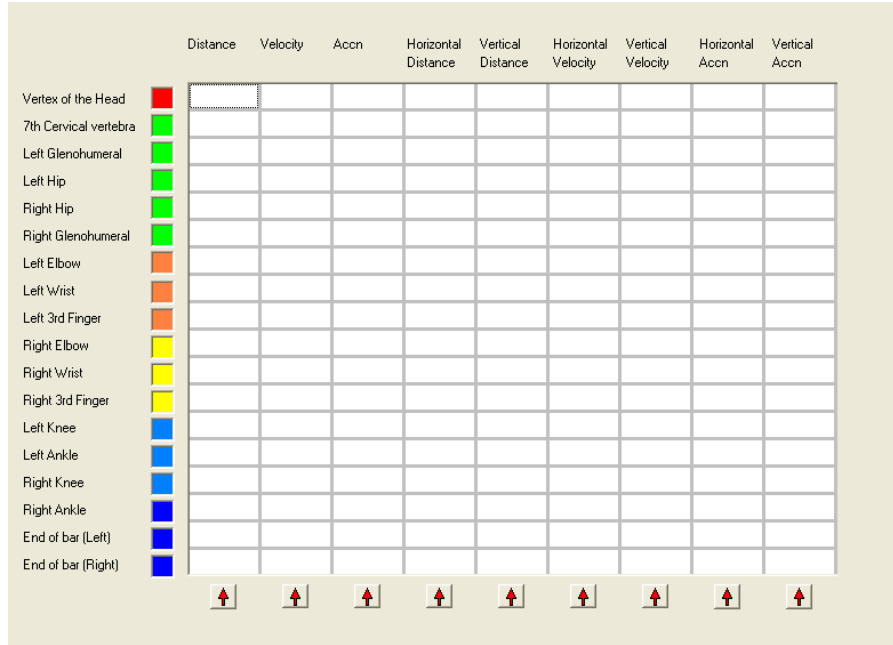
	Distance	Velocity	Accn	Horizontal Distance	Vertical Distance	Horizontal Velocity	Vertical Velocity	Horizontal Accn	Vertical Accn
Vertex of the Head									
7th Cervical vertebra									
Left Glenohumeral									
Left Hip									
Right Hip									
Right Glenohumeral									
Left Elbow									
Left Wrist									
Left 3rd Finger									
Right Elbow									
Right Wrist									
Right 3rd Finger									
Left Knee									
Left Ankle									
Right Knee									
Right Ankle									
End of bar (Left)									
End of bar (Right)									

d) Vertical distance of all points **with** exact values displayed. Horizontal acceleration of the right elbow and left knee **without** exact values displayed. Vertical velocity of the left knee **without** exact values displayed.

	Distance	Velocity	Accn	Horizontal Distance	Vertical Distance	Horizontal Velocity	Vertical Velocity	Horizontal Accn	Vertical Accn
Vertex of the Head									
7th Cervical vertebra									
Left Glenohumeral									
Left Hip									
Right Hip									
Right Glenohumeral									
Left Elbow									
Left Wrist									
Left 3rd Finger									
Right Elbow									
Right Wrist									
Right 3rd Finger									
Left Knee									
Left Ankle									
Right Knee									
Right Ankle									
End of bar (Left)									
End of bar (Right)									

12) Open the Excel spreadsheet that has been created from the digitisation data.

In frame 55 what are the values of:

(i)   Horizontal distance of the ankle?

   ……………………………………………………………………

(ii)   Vertical velocity of the hip?

   ……………………………………………………………………

(iii)   Vertical acceleration of the knee?

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(iv)   Horizontal distance of the elbow ?

   ……………………………………………………………………

(v)   Acceleration of the wrist?

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13) Find the MAXIMUM values throughout the digitisation of:

(i)   Horizontal velocity of the shoulder?

   ……………………………………………………………………

(ii)   Distance of the wrist?

   ……………………………………………………………………

(iii)   Velocity of the ankle?

   ……………………………………………………………………

(iv)   Vertical acceleration of the knee?

   ……………………………………………………………………

(v)   Horizontal distance of the hip?

   ……………………………………………………………………

14) Use the Graph display options window to find the following data in frame 150

(i)   Velocity of the ankle?

   ……………………………………………………………………

(ii)   Velocity of the knee?

   ……………………………………………………………………

(iii)   Velocity of the hip?

   ……………………………………………………………………

(iv)   Velocity of the shoulder?

   ……………………………………………………………………

(v)   Velocity of the elbow?

   ……………………………………………………………………

(vi)   Velocity of the wrist?

   ……………………………………………………………………

15) Look at the graphs and data that have been produced by the digitisation that you have just completed. Use your experience and sports science background to suggest interventions and training methods to improve the athletic performance of the weightlifter.

Quintic would like to thank Steve Backley and the PAC Team
for supplying the video footage.
All video footage was captured and edited using Quintic Biomechanics
9.03v9 by Quintic Consultancy Ltd.

PAC training

http://www.pactraining.co.uk/