		Name			
Mat	ching	Choices may be used more than once or not at all.			
1-5.	Place these structures in the order they are affected by s	ound waves entering the ear.			
A)	Hair cells	first	1)		
B)	Perilymph	second	2)		
C)	Oval window	third	3)		
D)	Auditory ossicles	fourth	4)		
E)	Tympanic membrane	fifth	5)		
6-10	6-10. Place these events in the order they occur in response to movement of the basilar membrane				
A)	Movement of the stereocilia open cation channels and c	depolarizes hair cells first	6)		
B)	Synaptic vesicles fuse with the presynaptic membrane of	of the hair cell second	7)		
C)	Glutamate is released from synaptic vesicles of the hair	cells third	8)		
D)	Stereocilia of the hair cells bend against tectorial memb	rane fourth	9)		
E)	Voltage gated Ca ²⁺ channels open in the hair cells	fifth	10)		
11-1	5. Place in order the central pathways for perception of s	ound.			
A)	Cochlear nerve	first	11)		
B)	Auditory Cortex	second	12)		
C)	Inferior Colliculus of Midbrain	third	13)		
0)	Ventral Cochlear Nucleus of Medulla	fourth	14)		
E)	Medial Geniculate Nucleus of Thalamus	fifth	15)		
16-2	0 Place these structures in the order light waves pass in	to the eve and through the retina			
Δ)	Retinal ganglion cells	firet	. 16)		
R)	Photoreceptor cells	second	17)		
	Crystalling long	third	17)		
	Corpos	fourth	10)		
	Dunil	iouitii titte	19)		
_)	Pupii	111(11	20)		
21-2	5. Matching (in the context of photoreceptors)				
A)	Hyperpolarizes and secretes less glutamate	Rod exposed to red	21)		
B)	Depolarizes and secretes more glutamate	Rod exposed to blue/green	22)		
	Red	absorbing cone exposed to red	23)		
	Blue ab	sorbing cone exposed to yellow	24)		
	Green abso	rbing cone exposed to magenta	25)		
26-3	0. Place these structures in the order that neural signals	travel in the retina and then into t	the CNS		
A)	Optic nerve	first	26)		
ВĴ	Bipolar cells	second	27)		
с́о	Photoreceptor cells	third	28)		
D)	Retinal ganglion cells	fourth	29)		
E)	Lateral geniculate nuclei of thalamus	fifth	30)		
31-3	5. Matching (connected to)				
A)	Left retina of left eve	Left optic tract	31)		
B)	Left retina of right eve	l eft optic nerve	32)		
\dot{c}	Right retina of left eve	Left superior colliculus	33)		
ט) וח	A and B	Left primary visual cortox	34)		
	A and C	Left primary visual contex	35)		
L)		Len lateral geniculate nucleus	JJ)		

36-40	0. Matching				
A)	Astigmatism	requires complementary cylindrical eyeglasses for c	correction	36)	
B)	Emmetropia	Uses about +7 diopter eye lens for far vision (no eyeglasses	required)	37)	
C)	Hyperopia	With +7 diopter eye lens, requires (-) diopter eyeglasses for	far vision	38)	
D)	Myopia	Uses about +20 diopter eye lens for close vision (no eyeglasses	required)	39)	
		With +20 diopter eye lens, requires (+) diopter eyeglasses for clo	se vision	40)	
41-4	5. Place the foll	owing events in the order they occur to cause contraction of a skeleta	l muscle ce	ll. Sta	rt at C.
A)	Muscle cell c	ontracts	first	41)	
B)	Myosin heads	s bind to actin	second	42)	
C)	Ca ²⁺ diffuses	into intracellular fluid	third	43)	
D)	Myosin head	bends and pulls actin toward M-line	fourth	44)	
E)	Ca ²⁺ binds to	troponin and moves tropomyosin away from actin	fifth	45)	
46-50	0. Place these	events in the order they occur to cause contraction of a skeletal	muscle cel		
A)	Ca ²⁺ ions diff	use into intracellular fluid	first	46)	
ВĴ	Ca ²⁺ binds to	troponin and uncovers actin	second	47)	
C	Ca ²⁺ channe	ls open in sarcoplasmic reticulum	third	48)́	
D)	Acetvlcholine	binds to nicotinic-m receptors of skeletal muscle cell	fourth	49)	
E)	Action potent	al propagates along sarcolemma of skeletal muscle cell	fifth	50)	
,	• • • •			,	
51-5	5. Place these	events in the order they occur to cause contraction of a cardiac i	<u>muscle cell</u>		
A)	Ca ²⁺ ions diff	use into intracellular fluid	first	51)	
B)	Ca ²⁺ binds to	troponin and uncovers actin	second	52)	
C)	Ca ²⁺ channel	s open in transverse tubules / sarcoplasmic reticulum	third	53)	
D)	Action potent	al propagates along sarcolemma of cardiac muscle cell	fourth	54)	
E)	Na ⁺ and Ca ²⁺	ions diffuse through gap junctions into <u>cardiac muscle cell</u>	fifth	55)	
		events in the order they easure to source contraction in a smooth mus			
00-00 A)	The myocin of	events in the order they occur to cause contraction in a smooth mus	<u>firct</u>	56)	
		s and alongatos muosin boads	cocond	50)	
	The myosin h	eads band and null actin toward M-lines	third	58)	
	MLC kiposo pl	eaus benu and puil actin toward m-intes	fourth	50)	
	Myosin light c	bain (MLC) kinase is activated by calcium-calmodulin	fifth	60)	
L)	wyosin iigiit c		mur	00)	
61-6	5. Place these	events in the order they occur during cross-bridge cycling in a sk	eletal mus	cle ce	ell.
A)	ATP binds to	myosin and causes the myosin cross-bridge to release from actin	first	61)	
B)	The myosin c	ross-bridge recoils back to original shape (bends) and pulls actin	second	62)	
C)	ADP is releas	ed, but the myosin head remains bound to actin	third	63)	
D)	ATP binding e	energizes (elongates) the myosin cross-bridge	fourth	64)	
E)	The myosin c	ross-bridge binds with the actin	fifth	65)	
CC 70	0 Matahing				
00-70			overant	66)	
A) D)	Large motor	units Generally control gross in	lovement	(00) (7)	
		Inits Generally control precise in		67) 69)	
C)	A and b	Enclude a gamma motor neuron and muscle spi		00)	
		Small alpha motor neurons connected to rew skeletal mu		69) 70)	
		Large alpha motor neurons connected to many skeletal mu		70)	
71-7	5. Place these	events in the order they occur in response to stimulation of an al	pha <u>motor</u>	neuro	<u>on</u> .
A)	Synaptic vesi	cles fuse to presynaptic membrane of motor neuron	first	71)	
B)	Acetylcholine	is released from synaptic bulb of motor neuron	second	72)	
C)	Action potent	ial is generated at axon hillock and into axon	third	73)	
D)	Dendrites of I	notor neuron respond to glutamate	fourth	74)	
E)	Ca ²⁺ enter sy	naptic bulb of motor neuron	fifth	75)	

76-80. Place the following in the order that signals from muscle spindles travel to cause muscle contraction.

A)	Skeletal muscle cells	first	76)
B)	Posterior horn of spinal cord	second	77)
C)	Muscle spindle sensory neurons	third	78)
D)	Stretch receptors around muscle spindles	fourth	79)
E)	Alpha motor neurons in anterior horn of spinal cord	fifth	80)

81-85. Place the following in the order that signals from nociceptors travel to cause muscle contraction.

A)	Limb flexor muscles	first	81)
B)	Posterior horn of spinal cord	second	82)
C)	Cutaneous nociceptor neurons	third	83)
D)	Alpha motor neurons in anterior horn of spinal cord	fourth	84)
E)	Excitatory and inhibitory interneuron in posterior horn of spinal cord	fifth	85)

86-90. Matching

- A) Control distal and precision muscles Small motor units 86) _____ Large motor units 87) _____
- B) Control axial and postural muscles

- Corticospinal tract 88) _____
- Medial motor pathways 89) _____
- Lateral motor pathways 90)

91-95. Matching A) Lateral motor pathways

Include the corticospinal tract 91)

- B) Medial motor pathways
- Control axial and postural muscles 92) _____ Control distal and fine (precision) muscles 93) _____
- Include the vestibulospinal tract for control of balance 94)
- Include the tectospinal tract for control of orientation of head and eyes 95) ____

Fill in

- 1. Low frequency sound is detected by the portions of the basilar membrane of the cochlea that are more _____ (characteristic)
- 2. Movement of the basilar membrane and/or tectorial membrane causes the ______ of the hair cells to move.

3. An image is focused on the retina by both the ______ and the ______.

The loss of elasticity of the lens with increasing age is called _____ _____•

5. Near sightedness is corrected with _____ lenses.

6. Light striking the retina is detected by _____ cells

- 7. Damage to the left optic tract would cause blindness in the ______ visual field.
- 8. Damage to the temporal lobe would interfere with perceiving the of words.

9. An image is focused on the retina by refraction in the _____ and the _____.

10. Far vision becomes sharp when the ciliary muscle ______.

11. Near sightedness is corrected with ______ eyeglasses.

12. An abnormal growth of fibrous tissue of the eye lens, causing clouding, is called a _____

- 13. _____ binds to nicotinic-m receptors in the motor endplate of skeletal muscle cells.
- 14. Release of Ca²⁺ from the sarcoplasmic reticulum in skeletal muscle cells depends on the generation of ______ in the sarcolemma and transverse tubules.
- 15. In ______ and _____ muscle, the ATPase of the heads of the myosin is always active and able to break apart ATP and energize the myosin.
- 16. In ______ muscle, the ATPase of the heads of the myosin is inactive and <u>unable</u> to break apart ATP until activation of the ATPase by myosin light chain (MLC) kinase.
- 17. In skeletal and cardiac muscle Ca²⁺ binds to ______ and uncovers actin.
- 18. In smooth muscle Ca²⁺ binds to ______ and activates MLC kinase, which in turn activates the ______ of the myosin heads.
- 19. Binding of ______ (a protein) to ______ (a protein) causes muscle contraction
- 20. The motor end plates of skeletal muscle cells are innervated by ______ motor neurons.

21. Skeletal muscle length is controlled largely by _____ reflexes.

- 22. Skeletal muscle length is measured by ______ sensory neurons.
- 23. _____.motor neurons stimulate the contraction of muscle spindles and thereby adjust the set point of muscle spindles
- 24. Withdrawal of a limb from noxious stimulation requires ______ of flexor motor neurons and ______ of extensor motor neurons.
- 25. The ______ tract is involved in controlling muscles for posture in response to signals from the semicircular canals.
- 26. The ______ tract is involved in controlling muscles for movement of the head and trunk in response to signals from the eyes.
- 27. The ______ tract is involved in controlling the excitability (sensitivity) of alpha motor neurons in the spinal cord and brain stem.
- 28. The ______ tract is involved in integrating the control of muscles located distally with the control of muscles located proximally.
- 29. The ______ tract is involved especially in the control of muscles located distally for precise movements.
- 30. The ______ nuclei are involved in initiating the control of muscles in voluntary movements.
- 31. Abnormally low secretion of ______ by the substantia nigra is associated the loss of intentional control of movement, seen clinically as Parkinson's Disease.

Name Matching Choices may be used more than once or not at all. 1-5. Place these structures in the order they are affected by sound waves entering the ear. Hair cells A) first 1) E B) Perilymph second D C) Oval window third С 3) D) Auditory ossicles fourth 4) В E) Tympanic membrane fifth 5) _A 6-10. Place these events in the order they occur in response to movement of the basilar membrane Movement of the stereocilia open cation channels and depolarizes hair cells A) first 6) D Synaptic vesicles fuse with the presynaptic membrane of the hair cell B) second 7) Glutamate is released from synaptic vesicles of the hair cells C) third Е 8) Stereocilia of the hair cells bend against tectorial membrane D) fourth 9) В Voltage gated Ca²⁺ channels open in the hair cells E) fifth 10) C 11-15. Place in order the central pathways for perception of sound. A) Cochlear nerve first Auditory Cortex B) second 12) D Inferior Colliculus of Midbrain C) third 13) C Ventral Cochlear Nucleus of Medulla D) fourth 14) E E) Medial Geniculate Nucleus of Thalamus fifth 15) B 16-20. Place these structures in the order light waves pass into the eye and through the retina. Retinal ganglion cells A) first 16) D B) Photoreceptor cells second 17) E Crystalline lens 18) C) third С D) Cornea fourth 19) А E) Pupil fifth 20) <u>B</u> 21-25. Matching (in the context of photoreceptors) Hyperpolarizes and secretes less glutamate Rod exposed to red A) 21) B Rod exposed to blue/green Depolarizes and secretes more glutamate 22) B) А 23) _ Red absorbing cone exposed to red Α Blue absorbing cone exposed to yellow 24) В Green absorbing cone exposed to magenta 25) B 26-30. Place these structures in the order that neural signals travel in the retina and then into the CNS A) Optic nerve first 26) __C_ second 27) __B__ B) **Bipolar cells** C) Photoreceptor cells third 28) D Retinal ganglion cells D) fourth 29) A Lateral geniculate nuclei of thalamus E) fifth 30) __E_ 31-35. Matching (connected to) Left retina of left eye Left optic tract A) 31) D Left retina of right eye Left optic nerve 32) E B) C) Right retina of left eye Left superior colliculus 33) D D) A and B Left primary visual cortex 34) D E) A and C Left lateral geniculate nucleus 35) D

Physiology 101

30-40). Matching				
A)	Astigmatism	requires complementary cylindrical eyeglasses for c	orrection	36) _	_A
B)	Emmetropia	Uses about +7 diopter eye lens for far vision (no eyeglasses	required)	37)	_B
C)	Hyperopia	With +7 diopter eye lens, requires (-) diopter eyeglasses for f	far vision	38)	D
D)	Myopia U	ses about +20 diopter eye lens for close vision (no eyeglasses	required)	39)	В
,	Wit	h +20 diopter eye lens, requires (+) diopter eyeglasses for clo	se vision	40) _	_C_
				, –	
41-45	5. Place the following	ng events in the order they occur to cause contraction of a skeletal	l muscle ce	<u>II</u> . Star	t at C.
A)	Muscle cell contr	acts	first	41) _	_C
B)	Myosin heads bir	nd to actin	second	42) _	E
C)	Ca ²⁺ diffuses into	o intracellular fluid	third	43) _	B
D)	Myosin head ber	nds and pulls actin toward M-line	fourth	44) _	_D
E)	Ca ²⁺ binds to trop	ponin and moves tropomyosin away from actin	fifth	45) _	_A
46-50). Place these eve	ents in the order they occur to cause contraction of a <u>skeletal r</u>	muscle cel		-
A)		Into Intracellular fluid	tirst	46)_	_ <u>D</u>
B)	Ca ²⁺ binds to trop	ponin and uncovers actin	second	47)_	_E
C)	Ca ²⁺ channels o	pen in sarcoplasmic reticulum	third	48) _	_C
D)	Acetylcholine bin	ds to nicotinic-m receptors of skeletal muscle cell	fourth	49) _	_A
E)	Action potential p	propagates along sarcolemma of <u>skeletal muscle cell</u>	fifth	50) _	_B
51 5	E Diago those over	ante in the order they easur to eque contraction of a cordiae r			
01-00 A)	Co^{2+} ions diffuso	into intracellular fluid	firct	51)	E
	Ca^{2+} binds to trop		nisi	57)	
	Ca Diffus to $\underline{II0}$	<u>Johini</u> and uncovers actin	second	52)_	
U)			fourth	53)_ 54)	_C
	Action potential p	nopagates along sarcolemina of <u>cardiac muscle cell</u>	10UIIII	54)_	_A
⊏)		is diruse through gap junctions into <u>cardiac muscle cell</u>	IIIIII	- (cc	_D
56-61) Place these eve	nts in the order they occur to cause contraction in a smooth mus	الم مام		
56-6(⁽⁾). Place these eve	nts in the order they occur to cause contraction in a <u>smooth mus</u>	<u>cle cell</u> . first	56)	F
56-6(A) B)). Place these eve The myosin cros	nts in the order they occur to cause contraction in a <u>smooth mus</u> s-bridges bind to actin nd elongates myosin heads	<u>cle cell</u> . first	56) _ 57)	_E
56-60 A) B)). Place these eve The myosin cros ATP energizes an The myosin beac	nts in the order they occur to cause contraction in a <u>smooth mus</u> s-bridges bind to actin nd elongates myosin heads is bend and pull actin toward M-lines	<u>cle cell</u> . first second third	56) _ 57) _ 58)	_E _D B
56-60 A) B) C)). Place these eve The myosin cros ATP energizes at The myosin head	nts in the order they occur to cause contraction in a <u>smooth mus</u> s-bridges bind to actin nd elongates myosin heads Is bend and pull actin toward M-lines aboutates (activates) the ATPase of myosin	<u>cle cell</u> . first second third	56) _ 57) _ 58) _	_E _D _B
56-60 A) B) C) D)	D. Place these eve The myosin cross ATP energizes and The myosin head MLC kinase phose Myosin light chair	nts in the order they occur to cause contraction in a <u>smooth mus</u> s-bridges bind to actin nd elongates myosin heads Is bend and pull actin toward M-lines phorylates (activates) the ATPase of myosin p (MLC) kinase is activated by calcium-calmodulin	<u>cle cell</u> . first second third fourth fifth	56) _ 57) _ 58) _ 59) _	E D B A
56-60 A) B) C) D) E)	D. Place these eve The myosin cros ATP energizes an The myosin head MLC kinase phosp Myosin light chain	nts in the order they occur to cause contraction in a <u>smooth mus</u> s-bridges bind to actin nd elongates myosin heads Is bend and pull actin toward M-lines ohorylates (activates) the ATPase of myosin n (MLC) kinase is activated by calcium-calmodulin	<u>cle cell</u> . first second third fourth fifth	56) _ 57) _ 58) _ 59) _ 60) _	_E D _B _A _C
56-60 A) B) C) D) E) 61-65	 Place these eve The myosin cros ATP energizes an The myosin head MLC kinase phose Myosin light chain Place these even 	nts in the order they occur to cause contraction in a <u>smooth mus</u> s-bridges bind to actin nd elongates myosin heads Is bend and pull actin toward M-lines phorylates (activates) the ATPase of myosin n (MLC) kinase is activated by calcium-calmodulin ents in the order they occur during cross-bridge cycling in a sk	<u>cle cell</u> . first second third fourth fifth eletal mus	56) _ 57) _ 58) _ 59) _ 60) _ cle ce	_E _D _B _A _C
56-60 A) B) C) D) E) 61-65 A)	 Place these eve The myosin cros ATP energizes an The myosin head MLC kinase phosp Myosin light chain Place these eve ATP binds to myo 	nts in the order they occur to cause contraction in a <u>smooth mus</u> s-bridges bind to actin nd elongates myosin heads is bend and pull actin toward M-lines ohorylates (activates) the ATPase of myosin n (MLC) kinase is activated by calcium-calmodulin ents in the order they occur during cross-bridge cycling in a sk psin and causes the myosin cross-bridge to release from actin	<u>cle cell</u> . first second third fourth fifth eletal mus first	56) _ 57) _ 58) _ 59) _ 60) _ cle ce 61)	E D B A C II. A
56-60 A) B) C) D) E) 61-65 A) B)	 Place these eve The myosin cross ATP energizes an The myosin head MLC kinase phosp Myosin light chain Place these eve ATP binds to myosin The myosin cross 	nts in the order they occur to cause contraction in a <u>smooth mus</u> s-bridges bind to actin nd elongates myosin heads is bend and pull actin toward M-lines ohorylates (activates) the ATPase of myosin n (MLC) kinase is activated by calcium-calmodulin ents in the order they occur during cross-bridge cycling in a sk osin and causes the myosin cross-bridge to release from actin s-bridge recoils back to original shape (bends) and pulls actin	<u>cle cell</u> . first second third fourth fifth eletal mus first second	56) _ 57) _ 58) _ 59) _ 60) _ cle ce 61) _ 62)	E D A C II. A D
56-60 A) B) C) D) E) 61-65 A) B) C)	 Place these eve The myosin cross ATP energizes an The myosin head MLC kinase phosp Myosin light chair Place these eve ATP binds to myosin The myosin cross ADP is released 	nts in the order they occur to cause contraction in a <u>smooth mus</u> s-bridges bind to actin nd elongates myosin heads is bend and pull actin toward M-lines ohorylates (activates) the ATPase of myosin n (MLC) kinase is activated by calcium-calmodulin ents in the order they occur during cross-bridge cycling in a sk osin and causes the myosin cross-bridge to release from actin s-bridge recoils back to original shape (bends) and pulls actin but the myosin head remains bound to actin	cle cell. first second third fourth fifth eletal mus first second third	56) _ 57) _ 58) _ 59) _ 60) _ cle ce 61) _ 62) _ 63)	_E _D _A _C II. _A D F
56-60 A) B) C) D) E) 61-65 A) B) C) D)	 Place these eve The myosin cross ATP energizes an The myosin head MLC kinase phosp Myosin light chair Place these eve ATP binds to myosin The myosin cross ADP is released, ATP binding energi 	nts in the order they occur to cause contraction in a <u>smooth mus</u> s-bridges bind to actin and elongates myosin heads is bend and pull actin toward M-lines ohorylates (activates) the ATPase of myosin n (MLC) kinase is activated by calcium-calmodulin ents in the order they occur during cross-bridge cycling in a sk osin and causes the myosin cross-bridge to release from actin s-bridge recoils back to original shape (bends) and pulls actin but the myosin head remains bound to actin roizes (elongates) the myosin cross-bridge	cle cell. first second third fourth fifth eletal mus first second third fourth	56) _ 57) _ 58) _ 59) _ 60) _ cle ce 61) _ 62) _ 63) _ 64)	_E _D _A _C II. _A _D _E B
56-60 A) B) C) D) E) 61-65 A) B) C) D) E)	 Place these eve The myosin cross ATP energizes at The myosin head MLC kinase phosp Myosin light chair Place these eve ATP binds to myosin The myosin cross ADP is released, ATP binding energing 	nts in the order they occur to cause contraction in a <u>smooth mus</u> s-bridges bind to actin and elongates myosin heads is bend and pull actin toward M-lines ohorylates (activates) the ATPase of myosin n (MLC) kinase is activated by calcium-calmodulin ents in the order they occur during cross-bridge cycling in a sk osin and causes the myosin cross-bridge to release from actin s-bridge recoils back to original shape (bends) and pulls actin but the myosin head remains bound to actin rgizes (elongates) the myosin cross-bridge s-bridge binds with the actin	cle cell. first second third fourth fifth eletal mus first second third fourth fifth	56) _ 57) _ 58) _ 59) _ 60) _ 60) _ cle ce 61) _ 62) _ 63) _ 64) _ 65)	_E _D _A _C II. _A _D _E _B _C
56-60 A) B) C) D) E) 61-65 A) B) C) D) E)	 Place these eve The myosin cross ATP energizes an The myosin head MLC kinase phose Myosin light chain Place these eve ATP binds to myosin The myosin cross ADP is released, ATP binding energy 	nts in the order they occur to cause contraction in a <u>smooth mus</u> s-bridges bind to actin and elongates myosin heads ds bend and pull actin toward M-lines oborylates (activates) the ATPase of myosin n (MLC) kinase is activated by calcium-calmodulin ents in the order they occur during cross-bridge cycling in a sk osin and causes the myosin cross-bridge to release from actin s-bridge recoils back to original shape (bends) and pulls actin but the myosin head remains bound to actin rgizes (elongates) the myosin cross-bridge s-bridge binds with the actin	cle cell. first second third fourth fifth eletal mus first second third fourth fifth	56) _ 57) _ 58) _ 60) _ 60) _ cle ce 61) _ 62) _ 63) _ 64) _ 65) _	E
56-60 A) B) C) D) E) 61-65 A) B) C) D) E) 66-70	 Place these eve The myosin cross ATP energizes an The myosin head MLC kinase phosp Myosin light chain Place these eve ATP binds to myosin The myosin cross ADP is released, ATP binding energine The myosin cross Matching 	nts in the order they occur to cause contraction in a <u>smooth mus</u> s-bridges bind to actin and elongates myosin heads is bend and pull actin toward M-lines oborylates (activates) the ATPase of myosin in (MLC) kinase is activated by calcium-calmodulin ents in the order they occur during cross-bridge cycling in a sk osin and causes the myosin cross-bridge to release from actin s-bridge recoils back to original shape (bends) and pulls actin but the myosin head remains bound to actin rgizes (elongates) the myosin cross-bridge s-bridge binds with the actin	cle cell. first second third fourth fifth eletal mus first second third fourth fifth	56) _ 57) _ 58) _ 59) _ 60) _ 60) _ 60) _ 60) _ 62) _ 63) _ 64) _ 65) _	_E B _A _C II. _A E E C
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76-80. Place the following in the order that signals from muscle spindles travel to cause muscle contraction.

A)	Skeletal muscle cells	first	76)D
B)	Posterior horn of spinal cord	second	77)C
C)	Muscle spindle sensory neurons	third	78) <u>B</u>
D)	Stretch receptors around muscle spindles	fourth	79) <u> </u>
E)	Alpha motor neurons in anterior horn of spinal cord	fifth	80)A

81-85. Place the following in the order that signals from nociceptors travel to cause muscle contraction.

A)	Limb flexor muscles	first	81)C
B)	Posterior horn of spinal cord	second	82) <u>B</u>
C)	Cutaneous nociceptor neurons	third	83) <u> </u>
D)	Alpha motor neurons in anterior horn of spinal cord	fourth	84)D
E)	Excitatory and inhibitory interneuron in posterior horn of spinal cord	fifth	85) <u> </u>

86-90. Matching

- A)
 Control distal and precision muscles
 Small motor units
 86) __A_

 B)
 Control axial and postural muscles
 Large motor units
 87) __B_
 - Corticospinal tract 88) __A__
 - Medial motor pathways 89) __B__
 - Lateral motor pathways 90) __A__

91-95. Matching

Include the corticospinal tract 91) __A__

A) Lateral motor pathwaysB) Medial motor pathways

- Control axial and postural muscles 92) __B_ Control distal and fine (precision) muscles 93) __A
- Include the vestibulospinal tract for control of balance 94) B
- Include the tectospinal tract for control of orientation of head and eyes 95) ____

Fill in

- 1. Low frequency sound is detected by the portions of the basilar membrane of the cochlea that are more __flexible_____ (characteristic)
- 2. Movement of the basilar membrane and/or tectorial membrane causes the <u>stereocilia</u> of the hair cells to move.

3. An image is focused on the retina by both the **__cornea____** and the **__lens____**.

The loss of elasticity of the lens with increasing age is called __presbyopia_____.

5. Near sightedness is corrected with __concave_____ lenses.

- 6. Light striking the retina is detected by __photoreceptor_____ cells
- 7. Damage to the left optic <u>tract</u> would cause blindness in the **__right____** visual field.
- 8. Damage to the temporal lobe would interfere with perceiving the ___meaning_____ of words.
- 9. An image is focused on the retina by refraction in the **__cornea**_____ and the **__lens**_____.

10. Far vision becomes sharp when the ciliary muscle __relaxes_____.

- 11. Near sightedness is corrected with ___(-) diopter / concave_____ eyeglasses.
- 12. An abnormal growth of fibrous tissue of the eye lens, causing clouding, is called a __cataract____.
- 13. __Acetylcholine__ binds to nicotinic-m receptors in the motor endplate of skeletal muscle cells.
- 14. Release of Ca²⁺ from the sarcoplasmic reticulum in skeletal muscle cells depends on the generation of ______ potentials___ in the sarcolemma and transverse tubules.
- 15. In <u>skeletal</u> and <u>cardiac</u> muscle, the ATPase of the heads of the myosin is always active and able to break apart ATP and energize the myosin.
- 16. In <u>smooth</u> muscle, the ATPase of the heads of the myosin is inactive and <u>unable</u> to break apart ATP until activation of the ATPase by myosin light chain (MLC) kinase.
- 17. In skeletal and cardiac muscle Ca²⁺ binds to <u>troponin</u> and uncovers actin.
- 18. In smooth muscle Ca²⁺ binds to __calmodulin__ and activates MLC kinase, which in turn activates the __ATPase__ of the myosin heads.
- 19. Binding of __myosin__ (a protein) to __actin__ (a protein) causes muscle contraction
- 20. The motor end plates of skeletal muscle cells are innervated by __alpha__ motor neurons.
- 21. Skeletal muscle length is controlled largely by <u>stretch</u> reflexes.
- 22. Skeletal muscle length is measured by __muscle__ _spindle__ sensory neurons.
- 23. **___Gamma___** motor neurons stimulate the contraction of muscle spindles and thereby adjust the set point of muscle spindles
- 24. Withdrawal of a limb from noxious stimulation requires <u>excitation</u> of flexor motor neurons and <u>__inhibition</u> of extensor motor neurons.
- 25. The <u>vestibulospinal</u> tract is involved in controlling muscles for posture in response to signals from the semicircular canals.
- 26. The <u>tectospinal</u> tract is involved in controlling muscles for movement of the head and trunk in response to signals from the eyes.
- 27. The <u>reticulospinal</u> tracts are involved in controlling the excitability (sensitivity) of alpha motor neurons in the spinal cord and brain stem.
- 28. The <u>**rubrospinal**</u> tract is involved in integrating the control of muscles located distally with the control of muscles located proximally.
- 29. The <u>corticospinal</u> tract is involved especially in the control of muscles located distally for precise movements.
- 30. The **__basal**__ nuclei are involved in initiating the control of muscles in voluntary movements.
- 31. Abnormally low secretion of **__dopamine**__ by the substantia nigra is associated with the loss of intentional control of movement, seen clinically as Parkinson's Disease.